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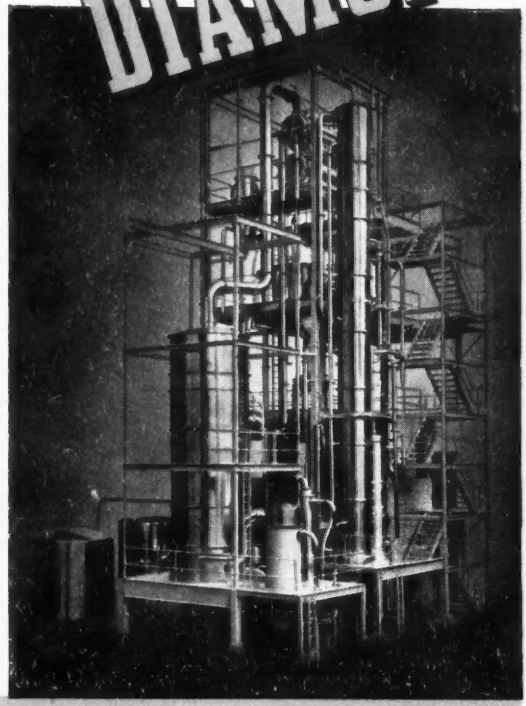

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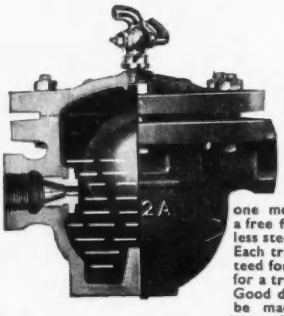

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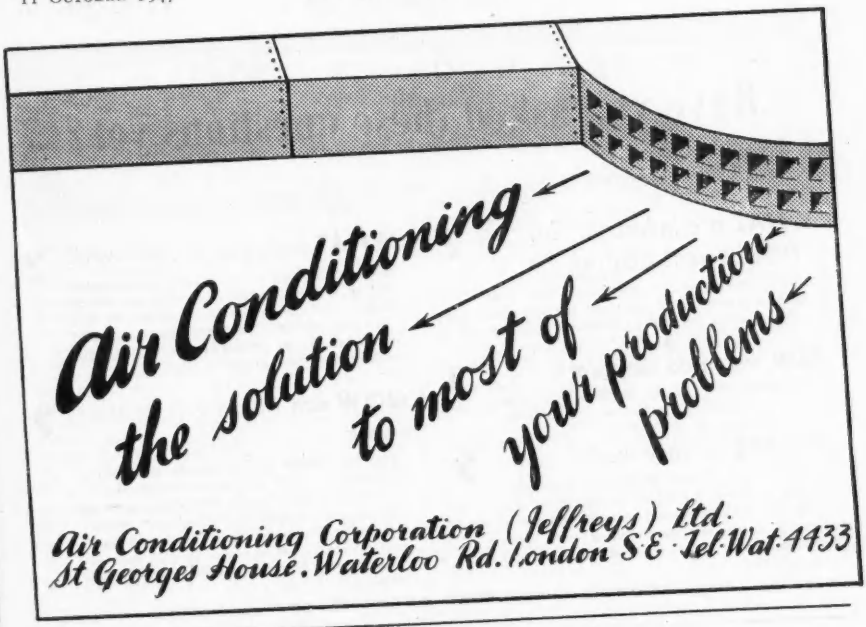

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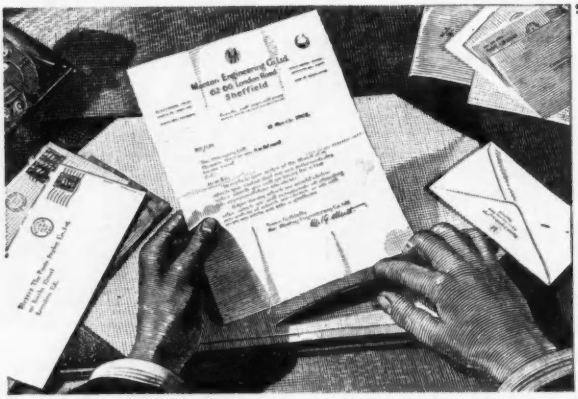

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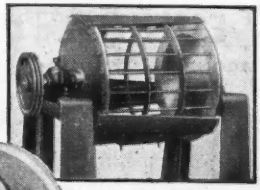

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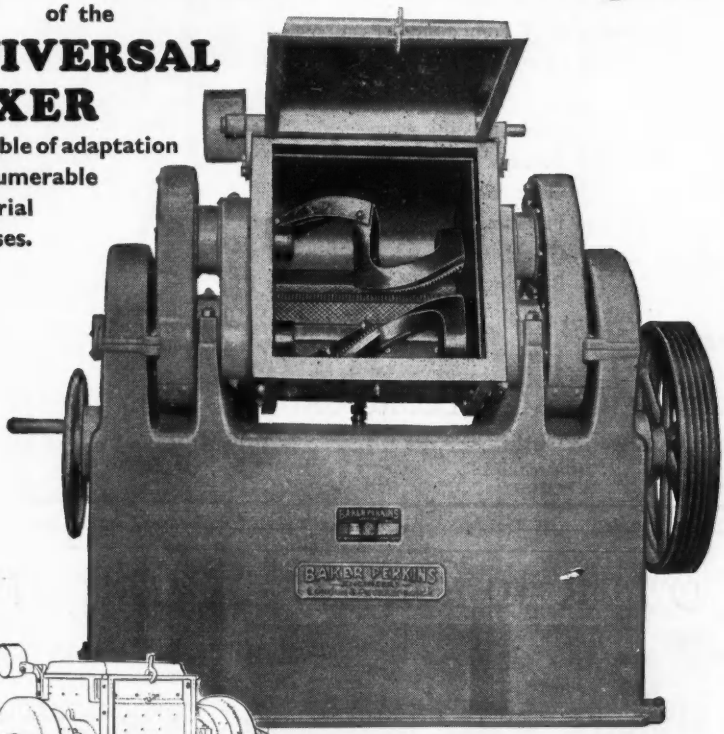

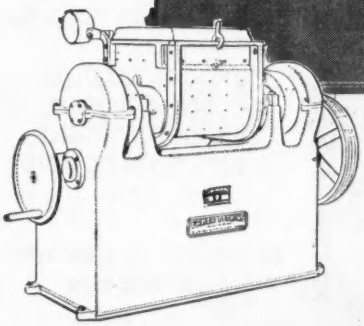

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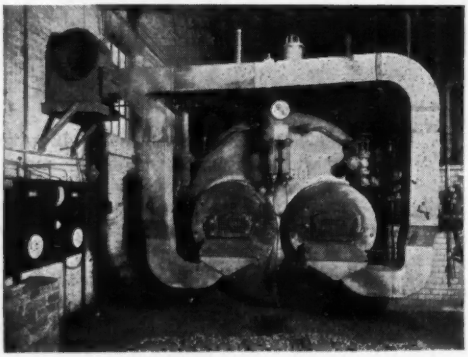

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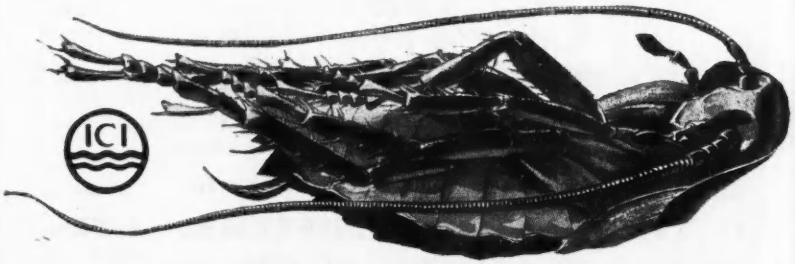

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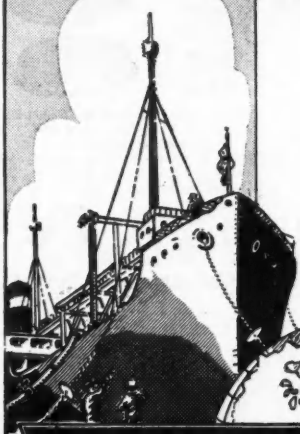

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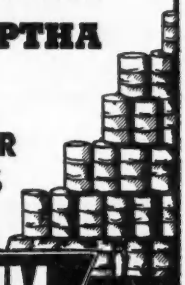

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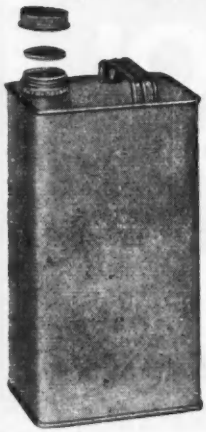
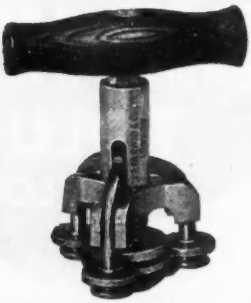


Square can showing patent screw neck.
Patent No. 382,380



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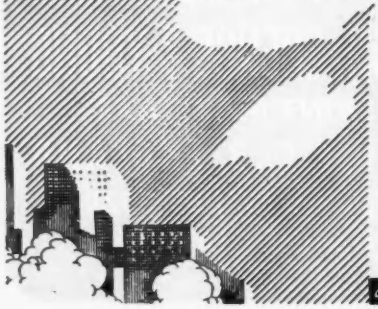

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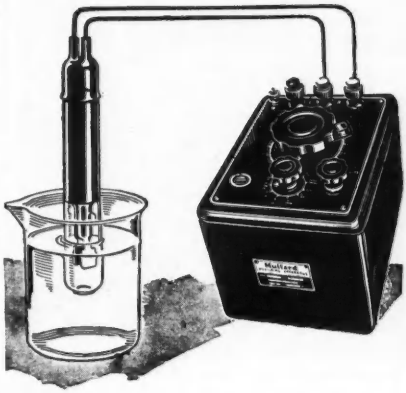

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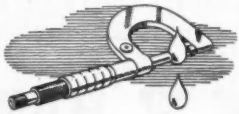

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The Chemist's Sphere

THE lecture delivered by Dr. Colgate to the Society of Chemical Industry raises a number of interesting speculations on the part played by the chemist in relation to the population as a whole. The chemist, however much he may vary from others as an individual, has in the mass certain characteristics. He is humble in the knowledge that he does not really know very much. Like Newton, he realises that the great ocean of truth lies all undiscovered before him. He has, however, to guide him a basis of ascertained fact and with that basis he can in turn guide the lives and actions of those around him insofar as applications of chemistry are concerned. His basic training, however, goes deeper than that. It teaches him to dissect his problems, removing what is known and proved from what is speculation, reducing the whole problem to its essentials, discovering its highest common factor, and thereby answering it in a way that avoids preconceived ideas, mass hysteria and other mental ills to which the world is very subject. The chemist should therefore serve partly as a stabilising force in the community and partly as a rock of common sense upon cold facts on which the waves of popular emotion break and are dissipated.

The world has changed in a remarkable manner within the lifetime of middle-aged men now living. Has there ever been a time when so many vast international issues have been raised, when there have been such striking social changes, and when values that seemed permanent to one generation have altered so quickly as to cause grave dislocation? Man's adaptability has been very severely tested during the last 40 years, principally, it must be confessed, in worsening economic conditions arising from the continuously decreased value of money. At the same time, there have arisen shortages of all that are generally considered essential for comfort, and sometimes for health; these shortages have been in part and at certain times artificial, due to over-production and consequently to prices lower than production costs, and at other times, as now, to under-production. The chemist has been blamed for many of these changes for having made his rate of discovery of new facts and processes too great. He has been praised for showing the way to new fields of economic endeavour. He is a key man in our economic system, and there has never been a time when so many have paid so much lip-service to research—generally without understanding in the least of what is involved. The chemist sees clearly that whatever be the economic difficulties of the world, the way to solve them is not to slow down research, but rather to speed it up. It is not by organising industry down to a dead level through nationalised combines that salvation lies, but rather through the play of competition. "In order to build a world of peace," said Bob Russell, President of the Standard Oil Development Company, "we must not only guard against deterioration of the high standards of technical achievement set during the war, but we must advance the effectiveness of our research, development and engineering even beyond the present high level. Given a free and truly competitive system in which to work, our scientific groups will

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deal successfully with the many problems the future will unquestionably bring."

The works chemist, in Dr. Colgate's experience—a very general experience—must be something of a chameleon, able to change his scientific colour at a moment's notice, to reflect chemistry, physics or chemical engineering and most of their off-shoots and to apply them to an increasing variety of problems. He must try to be Jack of all Trades, and master of some. To fulfil his destiny in the social life of the country, the chemist must be increasingly a man of affairs, and of wide interests. The ancient jibe that he is withdrawn from the world into a maze of test-tubes must be very far from the future truth. Dr. Colgate leaves us in no doubt that that is his opinion. "The scientist must be prepared from time to time to leave his laboratory; he cannot make the laboratory an ivory tower and leave all decisions about science, its place and rôle in the community to be made by his fellow citizens. By accepting his responsibilities and helping to form public opinion, opinion will be better informed and the likelihood of wise decision increased."

Before we can reach anything resembling the perfect world in which reason will take the place of animal desires, it is necessary that there should be a general spread of the knowledge of science. If reason were predominant to-day, we should not be seeking for means to induce certain sections of the community to work harder and so to pull their weight. Dr. Colgate's view is pessimistic: The man in the street is to-day almost as ignorant of the spirit of science, its past achievements and future potentialities, as was the original holder of the Piltdown skull. A drastic judgment, but to some extent justified. The chemist, along with his fellow scientists is the only man who can do much about it. Dr. Colgate holds that the chemist should develop public education in science. He suggests that a popular science club should be formed at a number of centres in the British Isles to which members of the public would come to hear discourses by local scientists in simple and interesting language, finishing with a free-and-easy discussion open to all. Dr. Colgate is an enthusiast and expects that the public would come to these meetings. Something after the lines of rotary clubs might work, but would the public come month by month to hear popular scientific discourses? Perhaps so: the idea is worth trying.

One of the difficulties in popularising science is that those who live by science are not well equipped to discuss their subject in popular language with the possessors of modern Piltdown skulls. Too many practitioners of science can write and talk only in terms of their own stilted technicalities. That is where a wider education comes into play. Should not the scientist in his school days be taught the minimum of science and the maximum of the humanities? The popular American high-class Press, we mention no names, frequently carries scientific or medical articles in which the achievements of science are described in somewhat flowery and over-enthusiastic language, usually linked to personalities, no doubt for the sake of popular appeal. To read these articles is for the scientist to feel that the whole thing is not in the best of taste, that the individuals mentioned must feel supremely uncomfortable, and that in any event the description has been over-simplified. That

feeling is due to our scientific up-bringing and to our habits of mind. The justification for the American method is that it is the way to get the achievements of science over to those who must be taught the easy way. This whole question of the education of the man-in-the-street in science is supremely important. Until it has been tackled successfully the chemist and his colleagues, will not be able to pull his weight in the social and economic life of the country.

NOTES AND COMMENTS

Labour Paradox

THE manufacture of heavy chemicals and chemical engineering plant is essential but " not very important." That, fantastic as it may seem, is the inescapable implication of the last and presumably final pronouncement of the Ministry of Labour's intentions in applying the new Control of Engagement Order, which came into force on Monday. Since then, it appears, any chemical manufacturer or chemical engineer who has engaged a workman by any means other than the local office of the Ministry of Labour has placed himself outside the law. Finding it difficult to credit that the omisson of chemical manufacturing and chemical engineering from either of the two lists of industries to which available labour is now to be directed could have been deliberate, this journal sought confirmation this week from the principal organisation representing chemical manufacturing employers and from the Ministry. The answers were, in different ways, alarming. The representatives of the organised manufacturers intimated that the implication of the new order was news to them and said—very understandably in the circumstances—they had no statement to make. The Ministry, after a suitable pause for cogitation, agreed to answer a specific query, provided it was made in writing, but not, fortunately, " through the usual channels." This query, or rather two of them, were at once posed to the Ministry, with results which are reproduced on another page.

Not " Very Important "

THE chemical and chemical engineering industries, states the Ministry, *are* " essential industries," but, because they are not " very important industries and services, undertakings in which are generally undermanned " they will not figure in the front rank for the purpose of future allocations of labour. If the chemical industries were " very important work where the shortage of labour is not general or where the work concerned is normally only a part of individual industrial undertakings " they would still rank second in the queue for labour. But they are not, and vacancies in these chemical industries —for which it is pertinent to note Sir Stafford Cripps recently set minimum monthly export targets of £5.45 million and £.12 million—must be filled " insofar as labour is available," meaning those whom the favoured industries do not want, or who decline to be directed to them. The contrast between the element of free will conceded to the worker and the control exercised over his employer is conspicuous.

Export Aids

THE exhibition of the latest achievements of electrodeposition, which was an important adjunct of the recent congress in London of international experts organised by the Electrodepositors' Technical Society, helped one to take a more optimistic view of our prospects of reaching the new inflated export totals now being called for. A non-commercial exhibition, devoted entirely to technology, it had the essential ingredients of a most profitable trade fair. Provided essential supplies are not curtailed, nothing is likely to lubricate overseas trading more effectively than some of the newer metal treatments shown in their highly attractive perfected form at this exhibition. Specially worth attention in this connection is the anodic polishing method represented by a number of small metal wares produced by the Walsall firm of W. Bate, Ltd. Its outstanding merit is that it eliminates at all stages the costly and generally disagreeable processes of hand or mechanical polishing. The anodic process now completely replaces this stage, leaving the work with a perfectly polished surface on which the final plating is deposited with admirable results. This outstanding contribution was, of course, only one of the very significant advances shown in the technique of electrodeposition, almost equally fruitful being the progress recently made in the application of

metal finishes to plastic bases, which promises to have very profitable uses in the production of decorative objects, and a new simplified method for the production of dies using easily worked plastic moulds. The value in present circumstances of innovations such as these cannot be exaggerated and the exchange of such kinds of information which the congress and the exhibition have permitted is the best pledge of the increasing usefulness of the Electrodepositors' Society.

Powell Duffryn and Borneo

ANY suggestion that the coalmines have been nationalised because of inefficiency on the part of the former owners—a line taken by some Government spokesmen—would seem to be inconsistent with the task recently allotted to Powell Duffryn, Ltd., by the Colonial Office. It may be fairly said of Powell Duffryn, Ltd., that it was the largest coal-producing concern of pre-nationalisation days—that is to say when coal was unrationed, reasonably priced, unassociated with labour troubles, and a considerable contributor to our national income. Through its subsidiary company, Powell Duffryn Technical Services, it has just sent a team of mining experts to Borneo where it will presumably search for coal deposits, and draw up development and production plans. It will be interesting to watch the outcome of these arrangements to see whether private enterprise with all its alleged shortcomings can succeed where a Government department did not care to set its foot.

NO PRIORITY FOR ATOMIC RESEARCH

WHY THE HARWELL PROJECT LOST SIX MONTHS

BRITAIN'S main hope of harnessing atomic energy to industry, the atomic research station at Harwell, Berkshire, is about six months behind schedule. That was stated by Dr. J. D. Cockroft, director of the Research Establishment on Atomic Energy, at an independent inquiry called for by the Select Committee on Estimates, the proceedings at which are now published as an official report (132-I, H.M.S.O., 6s.).

"Crux of the Job"

It was authoritatively stated that the reasons for this delay were the difficulty in obtaining supplies of all kinds and the fact that the research station enjoyed no special priority.

Mr. G. H. Bosworth, Assistant Secretary, Ministry of Works, which is responsible for the construction of Harwell, said that the cost so far was £1,343,375. "The great hold-up now," he said, "is not in the building, but on engineering supplies. The crux of this job is what priority we get on engineering supplies. We have no real priority. It has never been fixed—that is rather an astounding thing to say—as a top priority job.

"For instance, we cannot rob housing of labour if we want it. We cannot rob electrical undertakings of labour which is now being used to boost up the power stations.

"One of the relatively bad hold-ups is on the chemical laboratories. There are ducts and extractor fans, and all that sort of thing wanted."

Another serious contributor to the delay was uncertainty about the possible release into the Thames of radio-active elements. Sir Ralph Glyn, chairman of the sub-committee conducting the inquiry, said that the Thames Conservancy was holding up the project because it was not satisfied that the effluent would not have dangerous effect on London's water supply. Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research, said that the Water Pollution Research Laboratory was tackling this problem in association with the Medical Research Council.

Sir Archibald Rowlands, Permanent Secretary, Ministry of Supply, said the work was being done in such a highly unknown field it was impossible yet to say when they would produce the first fissile material for a generating station. America was probably far in advance of us, but it was by no means certain that we could expect to benefit from the findings of American experiments.

Better U.S. Linseed Crop

Reports from America state that this year's linseed crop is about 40 per cent above that for last year, and the general level of linseed oil stocks are said to be about 30 per cent higher on balance. It is therefore confidently expected that supplies will more than meet domestic demands, thus leaving a surplus for export.

Previous allocations of oil from the U.S. to Britain have been small compared with those from Argentina, though the latter country's prices have been higher than those which are expected to prevail in the U.S. this year.

CONTROL OF ENGAGEMENT ORDER

APPLICATION OF PRIORITY SYSTEM

IN order to facilitate a general understanding of the Control of Engagement Order, the Ministry of Labour has issued an explanatory outline of the arrangements whereby those workers covered by the Order may in future be engaged. It is laid down that the following two principles shall apply: (1) Applicants' skill should be used to best advantage, and (2) applicants should be accommodated quickly.

As workers become available, they will first be offered vacancies in what are described as "First Preference" industries, which include mining (coal, iron, oil-shale, clay, etc.), iron and steel producers, textiles, and agriculture. These industries are for the most part undermanned, and are important—directly or indirectly—to the export drive.

Second Choice

Next in order of priority are those industries similarly important to export trade, but where there is at present no general shortage of labour. Engineering firms engaged in the production of machinery for the "First Preference" industries or for direct export are generally included under this heading. Third and last on the priority list will be those vacancies occurring in industries which the Ministry may regard as having a bearing on the prosperity and well-being of the nation without necessarily affecting exports.

It is pointed out that, as experience is gained in the reallocation of labour, it may be necessary to amplify the general guidance principles as outlined above.

Questions to the Ministry

In order to clarify the position, THE CHEMICAL AGE this week asked the Ministry of Labour to answer the following questions relating to the two classes of industry to which workers will be directed.

(a) Does the exclusion of the chemical industry and the chemical engineering industry from List A (Very Important Industries and Services . . .) and List B (Very Important Work where the shortage of labour is not general . . .) indicate that there will be no priority given to these industries in the allocation of labour?

(b) How will labour be obtained to replace the constant wastage of manpower which these industries in common with others experience?

Offical Ruling

These are Ministry's replies:

(a) Inclusion in lists A and B means that vacancies in the industries or undertakings concerned will take precedence over others. These vacancies, if suitable, will be offered first to applicants under the scope of the Control of Engagement Order. If there are no suitable vacancies of this kind or an applicant is not prepared to consider any such vacancies he will be offered suitable vacancies on other essential work including vacancies in the chemical industry or the chemical engineering industry.

(b) Work in the chemical industry or the chemical engineering industry is regarded as essential and vacancies in these industries will be filled, insofar as labour is available, by workers not required in the industries, etc., in list A or B, or unwilling to take work in such industries.

POWER SAVING PLAN STARTS

INDUSTRIES all over the country on Monday had their first experience of the operation of the fuel economy system, involving an extension of the staggering of working hours and the application of the new rationing plan evolved by the Central Electricity Board.

The effect of the latter is to allot to distributors of electricity a fixed maximum to enable them to plan distribution and avoid unexpected interruptions in the supply. To keep within this maximum some local electricity authorities have divided their regions into five areas, withholding power from each on one or other of the five working days.

It is too early to evaluate the success of the new system, but reports from the important north-west industrial area seem to indicate that full co-operation has not yet been secured. Towards the required reduction there of 33 per cent, Liverpool was reported at the beginning of this week to have ready plans which would save 17 per cent, and Manchester and Salford about 25.

STEEL FIRM'S EXPERIMENT

FUEL load staggering was introduced at the Clyde Alloy Steel Works, Netherton, Motherwell, on September 29, a full week before the official load-saving scheme was due to commence. From that day onwards, the firm's No. 3 mill has operated a two-shift system over each 24-hour period. Only afternoon and night shifts are worked, thus cutting out the day-shift—which operated during the peak period—and enabling the firm to cut down by about 1000 kW.

Accidents with Acetylene

Explosives Inspectors' Report Gives Useful Data

IMPORTANT data relating to accidents associated with compressed acetylene and, to a smaller extent, with calcium carbide receive special attention in the 71st annual report of H.M. Inspectors of Explosives for 1946 (H.M.S.O., 1s.).

As indicated last week, an Order in Council under the Explosives Act has been drawn up to regulate the extended use in industry of acetylene under pressure. This is based on the results of investigations of a number of accidents, which the report summarises as follows:

(a) The greatest care should be taken in charging cylinders with porous mass in order to avoid any possibility of the presence of cavities; in addition, during the annual examination every effort should be made to ascertain whether any sagging of the mass has occurred and thus given rise to cavities.

(b) When testing the pressure of cylinders by means of a pressure gauge the valve of the cylinder should be opened slowly, otherwise ignitions may occur due to possible ignition by adiabetic compression.

(c) The utmost care should be taken to exclude copper from fittings such as pressure gauges in order to avoid the possible formation of copper acetylide. We would strongly urge the exclusion of copper alloys.

(d) Cylinders should be handled carefully and not submitted to shocks.

(e) When cylinders are involved in a fire the owners of the cylinders should be informed. It is possible, in these cases, some decomposition of the acetylene may have occurred with the production of carbon which may lead to a catalytic decomposition of acetylene in a cavity in the porous mass.

Checking Decomposition

An investigation into the properties of various porous masses has been started and so far the results show that where internal decomposition has started in the cylinder of dissolved acetylene, this decomposition is best checked by cooling externally with water and closing the valve of the cylinder. If the cylinder valve is opened the decomposition is aggravated and becomes progressive—hence the cylinder may burst.

The most serious of a number of accidents with gas cylinders described in the report relates to the bursting of a propane cylinder at a railway workshop. The exploding cylinder became a projectile which struck a group of workmen some 20 yards away.

Five men were killed and eighteen were injured more or less seriously. The explosion is thought to have been caused by the inadvertent coupling of the hoses of the propane cylinder and an oxygen cylinder being used in a flame cutting operation. The oxygen could thus have entered the propane cylinder and formed an explosive mixture which was probably ignited when the blowpipe was lit.

Less readily explicable was the explosion, fortunately without serious results, of an ethylene oxide cylinder eight hours after some of its contents had been removed. It is possible that polymerisation had taken place, leading to rapid decomposition of the ethylene oxide into gaseous products.

An important point which arises in more than one of the other accidents studied is that the use of copper or copper alloys in acetylene cylinders is inadvisable. In the presence of copper, which commonly represents a large proportion of the composition of Bourdon tubes, copper acetylide may be found and initiate an ignition.

Heat and shock are factors of other accidents which had led to the decomposition of acetylene in cylinders with destructive results.

EMPLOYMENT OF CHEMISTS

THE position of chemists in industry in relation to the Control of Engagement Order, which, as mentioned in THE CHEMICAL AGE last week, was at that time uncertain, has now been made clear. Information has now been received that scientists—among whom is specifically included the industrial chemist—are not covered by the order.

Fire Protection Association

Fire destruction in Britain last year cost over £12 million. This is the first consideration which has animated the formation of a national Fire Protection Association in collaboration with the Fire Offices' Committee of the insurance companies, the formation of which is announced this week in a booklet issued by the association from the Fire Offices' Testing Station, Boreham Wood, Elstree, Herts. Anyone becoming an associate member for an annual subscription of £1 will receive information on all developments in fire protection.

Hungarian Nationalisation.—Hungary intends to nationalise the bauxite and aluminium industries. As a result of the Hungarian-Jugoslavian aluminium agreement, the Hungarian Supreme Economic Council has established the "South-East European Industry Promoting Company" as a trading agency.

Progress in Industrial Measurement

Some New Scientific Aids Described

by L. SANDERSON

THE development of manufacturing processes in every field has led to an ever-increasing demand for more accurate and scientific methods of measurement. In the following notes an outline is given of some of the latest devices of which use is being made in industry to-day.

The New Potentiometer

The self-balancing recording potentiometer is becoming more and more widely used in chemical processing. In principle, the potentiometer determines the magnitude of the e.m.f. developed by a thermocouple, and its principle is indicated in Fig. 1. Such an instrument is basically designed to measure difference of electrical potential or pressure.

The wire of the potentiometer is initially standardised in terms of e.m.f. (AX) per unit length, and for this purpose the positive terminal of a standard Clark or Weston cell is connected to A and its negative terminal to B. The battery current is in this way opposed to that of the cell. By changing the position of X, it is possible to reach a point at which the galvanometer pointer is not deflected. The fall in potential between A and B is then equal to the e.m.f. of the standard cell, which is proportional to the length of AB.

Each unit of length of AB consequently stands for a definite e.m.f. if the resistance and e.m.f. in the battery circuit are maintained constant. If, then, the standard cell is replaced by a thermocouple, but the position of X is maintained, the contact B can be changed until, once more, no deflection of the galvanometer is discernible. When this new point of contact (B_1) is obtained, the e.m.f. developed by the thermocouple is AB_1/AB times that of the standard cell. In more practical forms, such as the Tinsley potentiometer, the wire AB is replaced by a series of small coils that can be successively inserted or removed from the thermocouple circuit.

The latest developments that have rendered the potentiometer suitable for chemical processing comprise fundamental modifications of improved kind in the mechanisms designed for detection and re-balancing. For example, instead of the standard galvanometer to detect changes in the measured variable, electrical means are being employed. Moreover, the cyclic rebalancing mechanism has been dispensed with, and in its place an electronically controlled motor has been introduced. This rebalances the indicating or recording system continuously so as to relate it to modifications in the measured variable.

The Converter

In one of the new potentiometers of this electronic type, the D.C. millivoltage set up by the thermocouple is altered to an A.C. of proportional voltage magnitude in a converter, consisting of a flat metallic reed oscillating between a pair of contacts linked up with the opposing extremities of the primary winding on an input transformer. The unbalanced D.C. voltage is impressed across the converter and the centre tap of the primary winding on this transformer.

When the reed passes from one contact to the other, any unbalanced D.C. voltages make D.C. flow initially in a single direc-

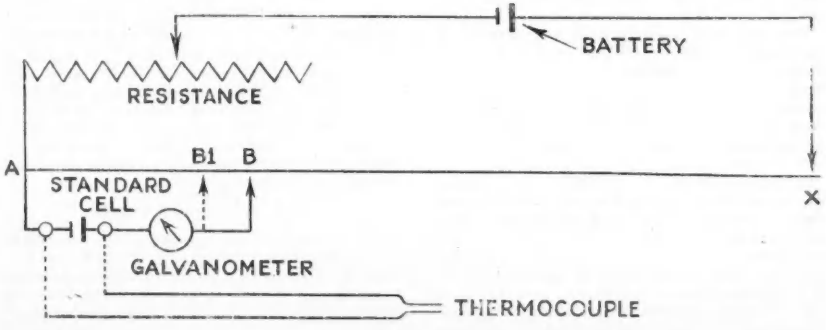


Fig. 1.

tion through one half the primary winding, and afterwards in the reverse direction through the remaining half. In this way an alternating flux is developed in the input transformer core, and this then induces an alternating voltage on the transformer secondary.

The converter action is related to A.C. voltage by an energising coil excited by A.C. voltage through a stepdown transformer. By means of a permanent magnet, polarisation of the reed is achieved, which reed is, in consequence, actuated by the energising coil to oscillate synchronically with the A.C. voltage. One contact to the transformer is closed by the reed for one half the supply voltage cycle, so that each cycle involves an entire oscillation.

The D.C. flowing in each half of the transformer primary winding consequently causes an alternating voltage in the transformer secondary, having identical frequency with the supply voltage. This alternating voltage is amplified in voltage and power to the point at which it will operate a two-phase balancing motor.

Unbalance between slide wire voltage and thermocouple voltage causes the balancing motor functions to rebalance the two voltages by moving the slider on the slide wire. The turning direction of the motor is governed by a specific phase relation between the A.C. voltage and the amplified A.C. thermocouple voltage, a relation that is naturally based on the increase or decrease in magnitude of the measured variable.

The result of these improvements is claimed to be a swifter operation, maximum sensitivity and precision of measurement, and higher reproducibility.

The Extensometer

This instrument is designed to measuure with precision extremely minute variations in length, mostly in parts or materials subjected to compression or tension. The extension has to be measured progressively in order that a load extension curve may be based on the data provided.

In the latest instruments this curve is automatically drawn by a subsidiary part of the appliance called the autographic recorder. The variations recorded by this instrument must be 0.0001 in. or even less than this, and the extensometer must also be adequate in strength to the work it is called upon to do.

A further point is that the weight of the appliance must not be too great, while the way in which it is secured to the specimen being tested must involve no distortion or mutilation of the material's surface. There must also be a minimum of moving parts in order to avoid backlash.

The most modern type comprises two closely similar portions secured by a joint clamp to opposing sides of the specimen. Each section comprises a pair of flat bars each having a 90 deg. angle of bend at one extremity, which is given a knife edge. Each bar comes into contact with the specimen on this knife edge, while the bars are so formed and fixed that some room is left between the flat parts. A small hardened steel roller is introduced into this space. The bars are able to move in relation to one another, but this motion, when the instrument is fixed in place, is obtained only by relative motion of the knife edges.

In consequence, when the specimen lengthens, the plates move in relation to one another, and the roller revolves through a small angle. By means of a small mirror fixed to the roller and a light beam focused on the mirror and reflected on to a graduated scale, it becomes possible to determine the amount of extension.

If two extension elements are employed, the average of the extensions on each side of the specimen can be measured, the light beam being focused on first one and then the other mirror, and so to the scale. This type of extensometer is capable of detecting an extension of 0.00001 in. in 8 in.

The Electrical Ionisation Gauge

This type of gauge is akin to a triode valve in shape, and is closed and sealed on to a vacuum system. It contains a filament or cathode which is raised in temperature by an electrical current, and on application of a positive potential to the anode, a current is generated.

This current is obviously composed of streams of electrons, and as these travel through the gas in the valve, they come into collision with the requisite proportion of molecules, which they ionise. As a result, the positively charged ions are drawn to the grid or collector, which is negatively charged, and in this way a small current is caused to flow in the circuit. The magnitude of this current is governed by the pressure at low values, as long as other factors remain constant.

The purpose of this type of measuring instrument is to give precise measurements of pressures ranging from 10^{-2} mercury down to the minimum obtainable, assuming that the instruments at hand have sufficient sensitivity to measure the ionisation currents. The actual calibration is governed by the gas present. This instrument is principally employed in the routine evacuation of valves and X-ray tubes.

The X-Ray Spectrometer

X-ray diffraction studies of materials have been handicapped in the past by the length of time and the elaborate technique required, but an X-ray spectrometer of geiger counter type has lately been introduced to shorten the period necessary for analysis, and virtually to remove.

the necessity of special procedures in carrying out analyses.

The old photographic film method in this type of analysis has been rendered obsolescent by the geiger muller tube, which actually counts the quanta of X-ray energy reflected from the sample. The tube has practically 100 per cent accuracy for the typical X-ray wave length employed, *i.e.*, one count is produced for almost every quantum passing into the tube.

The apparatus itself consists of a tube on the lines of the instrument described above, and caused to rotate through an arc of 90 degrees by a motor-driven scanning arm. The rotational speed is exactly co-ordinated with the chart speed of a high speed recording potentiometer to set up a precise space relation of the different humps and hollows of intensity from the specimen. Ninety minutes produce a complete diffraction pattern with the high speed recorded.

Among instruments now being widely used, particularly in gas works, to measure density, one may mention the specific gravity bell. This comprises a bell inverted and furnished at the top with a tube in which is a platinum plate, known as the orifice plate because of a tiny hole drilled in it.

The open end of the bell is placed in water inside a vessel. The period taken by a specific volume of gas to diffuse through a minute orifice varies inversely as the square root of the density of the gas.

The bell, in operation, is elevated and filled with air. When the tap is then opened, the air diffuses through the orifice plate, and a precision measurement of the time it takes the pointer to travel between two marks on the scale plate is made. The technique is repeated for the same volume of the gas whose density it is required to know. The periods of effusion and the density of the air being known, it becomes a simple matter to work out the density of the unknown gas.

The Interferometer

The basic principle of the interferometer is that if as a consequence of a single wave train there is a displacement X in a specified direction at a particular point and time, and by reason of a second train acting by itself there is a corresponding displacement Y, then the instantaneous consequent displacement R of both waves in combination is the algebraic sum of the separate displacement, *i.e.*, $R = X + Y$.

In the latest improved instrument of this type, no mechanical contact occurs between either end of the gauges, and for this reason there is no wear whatsoever on the master gauge. In addition, it becomes feasible to measure absolutely the master gauge length.

The instrument is designed in the following manner. A perceptibly parallel light pencil is divided in the normal manner at a half-silvered mirror (see Fig. 2). Taking the lower half of the half silvered mirror A first, the transmitted light travels to a mirror B in which it is reflected back along its own path, while the reflected light is thrown by another mirror C at an angle of 45 degrees on to the extremities of two gauges, whence the light is reflected back along its own path.

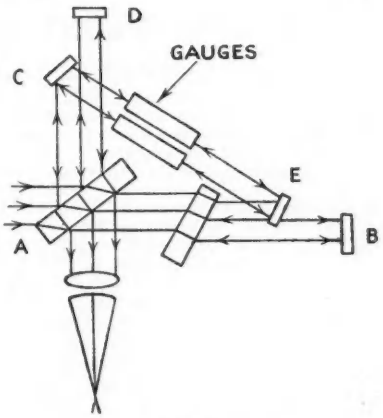


Fig. 2.

The mirrors and gauges are so located that all these paths are of the same length. Consequently, when recombined, they constitute fringes with white light. If the central black fringe is continuous in both surfaces, this pair of gauge surfaces must be in precisely the same plane.

Taking now the upper half of the half-silvered mirror, it will be found that the reflected light travels to a third mirror, D, and is thrown back along its own path, while the transmitted light travels to the mirror E, and is reflected to the other extremities of the gauges before it is thrown back along its own path, both beams coming together again to create a similar interference pattern.

When the gauges are not of the same length, the number of bands and parts of a band by which displacement of the fringe system occurs is measured, and the precise variation to a millionth of an inch in length ascertained.

If the two mirrors D and E concerned are inclined in the proper way, it becomes feasible to regulate the fringe spacing to whatever value is desired. Employment of the fractional band technique, together with a range of chosen wave lengths and a special reference gauge, enables the absolute length of a gauge to be established.

Chemical Statistics in July

Continued Increase in Employment

THE steady increase in employment in chemical and allied industries recorded every month since March this year was continued in July, as shown in the survey of national employment, production and use of basic materials provided by the *Digest of Statistics* prepared by the Central Statistical Office (H.M.S.O., 2s. 6d. net).

The total labour force engaged in July in production of chemicals, explosives, paints, oils, etc., was 352,000, as compared with 351,100 in the previous month and 335,800 in June last year. The same trend is reflected in a further grouping under the head of explosives, chemicals, coke ovens and by-product works, which employed a total of 238,600 in July, representing an increase of 2000 since May.

The production of scientific instruments employed 66,000 in July, a slightly smaller total than in most months since April.

Fewer Women

Increased employment of men and a small but consistent fall in the number of women engaged in the industries is a common feature of most of the employment records.

The summary of production, consumption and stocks of heavy chemicals and non-ferrous metals shows few very marked fluctuations when contrasted with returns for 1946. Of sulphuric acid 107,000 tons was produced in July, 2600 tons less than a year ago, consumption increased 2000 tons, but the stock position was, notwithstanding, slightly more favourable than it was a year before. Sulphur stocks also were substantially heavier, despite the fact that demand during the month was on a considerably larger scale; holdings of pyrites, however, were 9000 tons lighter.

There were good rises in the production figures of molasses (cane and beet) and industrial alcohol, the former totalling 11,700 tons, against 8800 a year ago, and the latter 2,680,000 bulk gallons, against 1,850,000. There was an appreciable rise in the use of industrial alcohol, but very much heavier stocks were held.

Production of most fertilisers was somewhat smaller; use of ammonia was rather lighter and stocks were heavier.

There was a good deal of fluctuation in supply and demand for non-ferrous metals, of which the most welcome feature was a fairly substantial rise in stocks of copper and lead.

SERVICE CHEMICALS FOR DISPOSAL

THE Ministry of Supply was offering this week "at a nominal figure" 410 tons of "anti-verm" residues extracted from Service clothing, consisting principally of 2 : 4-dichlorphenyl benzoyle chloramide (C_6M_4.$CO.NCl.C_6H_3Cl_2$). By suitable treatment benzoic acid and 2 : 4-dichloraniline can be recovered from the residues. It is estimated that 1 ton of anti-verm residues should yield 0.31 to 0.32 tons of benzoic acid and 0.41 to 0.42 tons of dichloraniline. The residues contain approximately 58 per cent of the pure compound with a certain amount of water and a small quantity of wool and cotton fibres from the clothing.

Any firm interested in this material, which is available at Bridgwater, Somerset, should apply to Ministry of Supply, A.D. of D (B.2), Room 222, Great Westminster House, Horseferry Road, London, S.W.1.

	July, 1947 Thousand tons			July, 1946 Thousand tons		
	Production	Consumption	Stocks	Production	Consumption	Stocks
Sulphuric acid	107	113	62.8	109.6	111	62.7
Sulphur	—	17.9	79	—	16.6	56.7
Pyrites	—	14.4	76	—	16.9	85
Spent oxide	—	14	151.5	—	15.6	139.6
Molasses	11.7	39.2*	106.9	8.8	26.9*	152.3
Industrial alcohol (million bulk galls.)	2.68	2.82	5.09	1.85	2.63	1.65
Superphosphate	63	59.7	105	73.3	76.1	83.7
Compound fertilisers	73	57.7	105	91.7	53.4	154.6
Agricultural lime	—	256.8	—	—	291.8	—
Ammonia	—	23.31 (23.7)†	3.52	—	24.29	3.44
Phosphate rock (agricultural)	—	54.7	138.9	—	54.7	145.5
Phosphate rock (industrial)	—	4.49	35.4	—	3.49	15.1
Virgin aluminium	2.37	13.4	—	2.74	9.2	—
Magnesium	0.15	0.42	—	0.17	0.12	—
Virgin copper	—	29.6	96.5	—	26.1	83.3
Virg'n zinc	—	17.8	31.5	—	17.8	70.4
Refined lead	—	16.1	32.3	—	17.8	23
Tin	—	2.37	16.8	—	3.97	20
Zinc concentrates	—	14.0	69	—	13.7	109

*Distilling only † August

FOOD YEAST FROM TIMBER WASTE

HIGH NUTRITIVE YIELDS OBTAINED

AMONG the papers read at the last Convention of the American TAPPI (Tech. Assn. of Pulp and Paper Industry) held in New York, was a further contribution to the interesting subject of utilising waste sulphite liquor for production of fodder yeast from its constituent wood sugars. The paper was by Elwin E. Harris and fellow workers.

This waste liquor and also wood hydrolysates contain carbohydrates which may be suitable for conversion. Sulphur dioxide is removed by steam treatment or precipitation with lime and the resulting solutions neutralised to *p*H 4—4.5, then concentrated to 40 per cent total solids. Suitable nutrients are added and the mass inoculated with a yeast of the *Torula* type.

The waste liquor is sterile and therefore very suitable for continuous propagation of yeast. There is, however, likely to be some trouble with excessive foaming, and this may be overcome by means of a mechanical device which allows the gas bubbles to break as the liquid falls down a central draught tube. Magnesia base liquors may also be used.

Suitable Yeasts

In a paper on the same subject (*Ind. Eng. Chem.*, 1946, **38**, 617-19) various yeasts of the *Torula* class were compared, including *Torula*, *Mycoetorula*, and *Hansenula* strains, as to their suitability for this sugar conversion. They gave satisfactory results with waste liquor from Douglas fir hydrolysates, and there was seen to be little distinction in rate of growth, utilisation of sugar, yeast yield, and nutritional values.

The products should be an excellent source of protein, amino acids, and B vitamins, comparing favourably in this respect with the best strains of brewers' yeast. Yields of dry yeast ranged from 53-63 per cent of weight of sugar consumed.

This matter of using to good purpose waste liquor from the pulp mills has proved of particular interest in Florida and other south-eastern States, where there is a shortage of suitable feeding-stuffs for an ever-expanding cattle and poultry industry; and at the same time where there is also a considerable amount of this pulp material available but hitherto largely wasted.

In their paper on protein feed from sulphite waste liquor, Walker and Morgan (*Paper Trade Jnl.*, 1946, **123**, 43-7) refer to these conditions in Florida and other States and point out that only about half the wood going into the pulp and paper industry is fully utilised. The sugar present in the waste liquors is still wasted.

They found that the liquors obtained from cooking the southern pine differed in composition from those obtained from other sources. The percentage of combined sulphur is much higher and only a minor amount of sulphur dioxide can be recovered by either steaming or evacuation. Their method of producing yeast utilised more than 90 per cent of the reducing sugars, with only negligible quantities of ethyl alcohol.

Practical Problems

Their experiments were, however, not conducted on a scale sufficiently large to determine accurately the economics of the process. It appeared that aeration costs would be an important factor in working on a larger scale; and it is intended to carry out these larger scale operations in order to calculate these and other items. Meantime, the optimum conditions for the laboratory tests were found to be: *p*H 5.5—6, aeration 150 c.c. air per minute per litre of sulphite waste liquor (specific for size and shape of fermenter and air diffuser), nutrients were 2.0 g. of ammonium acid phosphate $(NH_4)_2HPO_4$ per litre, temperature 30-35° C. Strain of yeast used was *Torulopsis utilis*, var. *thermophilia*. Owing to surface activity, foaming was overcome by use of 0.1—0.2 per cent turkey red oil, which proved non-toxic to yeast, whereas other anti-foamers were extremely toxic. A short bibliography of 14 references is given.

A very detailed and well illustrated account of the use of sulphite liquors in Germany for food purposes, by working up into yeast products, is given by J. F. Saeman and co-workers in a special report issued by the Forest Products Laboratory of the U.S. Department of Agriculture. This is based on information obtained by the authors as members of the Forest Products unit of the Technical Intelligence Branch that visited Germany for the purpose. (*Paper Trade Jnl.*, 1946, **123**, 38-46.)

Big Yields in Germany

The production and utilisation of wood sugar played a small but significant part in aiding Germany's food supply during the war. Several different processes were tried, Scholler, Vogelbusch, Waldhof, etc. Plants producing alcohol by the first-named had a capacity of 10 million litres per annum, and those in which the alcohol was obtained from sulphite liquor had a yearly capacity of 25 million litres.

Total capacity of plants for production of yeast from wood sugar of all sources was more than 25,000 tons per annum; and additional plant for sulphite liquor yeast was

under construction at the end of the war.

Practically the whole available supply of this liquor was used to produce alcohol or yeast, the Waldhof method being almost exclusively used for that purpose, after several others, such as the small unit at the I.G. Farbenindustrie plant at Wolfen, had been tried.

The Waldhof is continuous, requires about 4½ hours, and uses mechanical aeration and foam-breaking equipment. Yields up to 40 per cent on reducing sugar content of the sulphite liquor were obtained, and spruce or beech were equally satisfactory.

This process had been in use for over four years. It appears to be well designed and efficient, and in the opinion of the investigators offers the best hope of effectively solving the sulphite liquor utilisation problem.

Full details, together with working data and blue prints, are available from the Forest Products Laboratory, U.S. Department of Agriculture, Madison 5, Wis. It is suggested that the technique employed may be useful for other industrial aerobic fermentations, such as for bakers' yeast and penicillin production.

High Food Value

The nutritive value of this sulphite liquor yeast has been thoroughly tested in other parts of the U.S.A., as recorded in several papers published in the *Northeastern Wood Utilisation Council Bull.*, 1946, No. 12, in which reference is made, *inter alia*, to work in this country, by the National Institute for Research in Dairying, Reading, in feeding tests with pigs, poultry, and cows, with 5-20 per cent yeast supplements.

In this particular paper, by R. S. Aries, it is also stated that sulphite waste liquor and wood sugars have been largely used in Germany as sources of yeast for meat substitutes, etc., forming a valuable source of protein and B vitamins. It is claimed that as a supplement to poor diets the effect of yeast exceeds that of milk or fish, whether for adults or children.

In a further paper by the same author, R. S. Aries (Polytech. Inst., Brooklyn, N.Y.) reference is made to the fact that yeasts vary little in analysis whether of the *Saccharomyces cerevisae* or *Torula utilis* type, and whether derived from molasses, wood sugars, sulphite waste liquors, or brewers' slops. Comparisons are made in nine tables with other protein materials, *e.g.*, the vitamin B group and amino acids, confirming the high value of yeast in this respect. It is also easily digestible, with an energy content of 4600 cal./kg., and approaches complete animal protein in nutritional value.

In the same series of papers (*loc. cit.*) M. M. Rosten discusses the economics of dry food yeast. The cost there is about 4 cents per lb., with a yield of 50-50 per cent of reducing sugars. A flow sheet simplifying German practice is proposed.

E. G. Ritzman (*loc. cit.*) University of New Hampshire, Durham, U.S.A., says that the consumption of concentrate feeds in New England is about 2.2 million tons; and he discusses the digestibility and use of available food proteins, including yeast, on the basis of nutrition experiments in the Nutrition Laboratory of the New Hampshire Agricultural Experimental Station.

Finally, E. Craseman and others (*loc. cit.*) describe results of pig-feeding tests. Animal proteins cannot be entirely omitted, and a mixture of 60 per cent wood sugar yeast with about 33 per cent animal protein is recommended.

Radio Active Materials

New Palestine Act

THE Palestine Administration has just introduced legislation controlling the prospecting for and mining of radio-active minerals, and their export and use. Despite the rulings of the Mining Ordinance and the Oil Mining Ordinance of 1938, no person may now prospect for or mine any radio-active mineral, except in accordance with the conditions of the High Commissioner's licence.

Persons granted the necessary licence must submit a monthly report of mining and prospecting operations to the Chief Secretary and the Controller. If minerals are found by an unlicensed person they cannot be removed without the consent of the Government. Infractions will be punished by two years in prison or a fine of £500—or both.

Materials Now Controlled

The materials controlled by the new Ordinance include any mineral containing uranium or thorium; minerals of the pitchblende group, including pitchblende, uraninite, ulrichite, broggerite, cleveite, and related mineral species; torbernite and autunite; secondary uranium minerals, including rutherfordine, uranite, uranophane, gummite, thorogummite, uranocircite, kasolite, becquerelite, and other silicates, hydrates, carbonates, phosphates or arsenates of uranium; carnotite; uranium-bearing niobate-titanate-tantalate ores, including euxenite, polycrase, blomstrandine, priorite, samarskite, fergusonite, betafite, plumboniobite, and related mineral species containing uranium oxide; and monazite, thorite, thorianite, and radio-active zircon.

American Chemical Notebook

From Our New York Correspondent

A POTENT force in combating commercial isolationism in the U.S. is the Twentieth Century Fund controlled by a realistic group which has studied world economic conditions and is doing its best to convince Americans of the necessity of reciprocal trading. The Fund has now released a highly interesting documentary film called "Round Trip: The U.S.A. in World Trade," through which audiences are being told in no uncertain terms that economic isolationism does not pay. In substance, the film declares that the people of the United States are paying out billions of dollars extra a year for goods which could be produced more efficiently and cheaply abroad. "These are the things we should make up our mind to import and concentrate our own efforts on agricultural and industrial products that we can turn out more efficiently than anyone else," says Dr. Winfield W. Riefler, of the Institute of Advanced Study, Princeton, New Jersey, who appears in the film. It will be used as a spearhead in a national campaign on world trade. The Advertising Council, the Junior Chamber of Commerce, the U.S. Department of Commerce and the League of Women Voters are among those groups which will use "Round Trip" to launch educational campaigns on America's rôle in foreign trade.

* * *

The Manufacturing Chemists' Association has just published Chemical Safety Data Sheet SD-15 on acetic anhydride, the fifteenth in the series of chemical product safety manuals being prepared by them. Designed for supervisory staffs and management, the manuals offer essential information for the safe handling and use of chemical products. Each lists the physical and chemical properties of the product, best shipping containers, container storing and handling and recommends personal protective equipment. The present safety data sheet on acetic anhydride is being distributed by the association, 608 Woodward Building, Washington 5, D.C., at the equivalent of 1s. per copy.

* * *

U.S. superphosphate production of 712,600 short tons in July this year was the lowest in any month, but was still 15 per cent above the figure for July, 1946. Total supply for the month exceeded 1,400,000 and was 12 per cent above June, 1947, and 21 per cent above July, 1946. July production of concentrated superphosphate fertiliser of 33,810 short tons was a gain of more than 3000 tons over the level of the previous month and almost 50 per cent more than was produced in July, 1946. This output, plus record high stocks of more than 58,000 tons on hand at the beginning of the month, brought the supply of the material for the first time above 90,000 tons.

* * *

Shortages of iron and steel are causing considerable concern to labour and industry in the U.S.A. The War Department's recent announcement that it plans to accelerate the flow of iron and steel scrap from its depots is a helpful and co-operative step. The War Department expects to supply approximately 500,000 tons of scrap by July, 1948, through the release of obsolete or obsolescent ammunition. To speed the output of scrap, the Secretary of War has appointed the Civilian Foundry and Scrap Industries' committee to serve with the War Department in an advisory capacity. Government agencies are believed to possess between two and three million tons of potential scrap in warehouses and in the form of war materials to be declared surplus and which it is believed will ultimately be offered as scrap. The total includes upwards of 300,000 tons of scrap in Europe under Army control.

* * *

Production of inorganic chemicals in the U.S.A. during the month of July declined slightly in comparison with June but maintained a relatively high level, according to the Bureau of the Census, Department of Commerce. A survey of 35 industrial chemicals disclosed that 19 were produced in lesser volume in July than in June, and only nine were produced at a lower rate this July than in July, 1946.

Chemicals whose production fell in July but held up well above a year ago include the acids—nitric, phosphoric (except from phosphate rock) and sulphuric-chlorine, oxygen, caustic soda and salt-cake. Those whose production fell below July, 1946, were: chrome green and molybdate chrome orange, dibasic calcium phosphate, lead arsenate, silver nitrate, sodium bicarbonate, and natural methanol. Record high production of carbon dioxide (liquid and gas and solid), natural soda ash, and phosphoric acid from phosphate rock was achieved during the month. Calcium arsenate and hydrogen were produced in larger quantity this July than during any month in several years.

* * *

Beginning this month, a substantial increase in the supply of Toxaphene,

chlorinated camphene, will be available for 1948 agricultural insect control, according to the Hercules Powder Company which manufactures the product at its Brunswick, Georgia, naval stores plant. Preliminary results of large-scale field tests being conducted by the U.S. Department of Agriculture and State Agricultural Experimental Stations have confirmed earlier findings showing that Toxaphene is effective against cotton insects, grasshoppers, and other agricultural insect pests. Increased production will be aided by the completion early next year of an expansion of plant facilities which will more than double the present rate of production.

* * *

An important development in the field of organic chemistry has just been announced by Dr. Howard E. Fritz, vice-president in charge of research of the B. F. Goodrich Company, Akron, Ohio, marking the successful completion of research work on a new organic chemical material known as beta-propiolactone, which promises to become as important as acetylene or chlorine. Experimental production of this new material is under way. Described at the recent national meeting of the American Chemical Society as "another fundamental tool in the complex science of manufacturing organic chemicals," its use as a basic chemical is stated to make possible for the first time in chemical history the commercial production of a series of organic chemicals hitherto regarded as laboratory curiosities. Substances which may be made from the new material are said to range from the liquid used in setting permanent waves to materials used in leather processing. Other fields in which it is expected to contribute either better or more economical products include: compounds for preserving fats and oils; thermo-setting resin products, which can be made tougher and less brittle; plant-growth initiators and mould-growth inhibitors; synthetic fungicides; selective weed-killers; and intermediates for the paint industry. Fundamentally, the method of manufacture of the new substance is through the combination of ketene and formaldehyde, Drs. Gresham and Jansen explained. The basic raw materials are coal and water, and ethyl alcohol, the latter derivable from grain, petroleum or coal. Manufacture of beta-propiolactone is now being carried out on a small scale at the experimental station in Ohio of B. F. Goodrich Chemical Company.

* * *

Formation of Winthrop-Stearns Inc., as a new subsidiary to integrate the major pharmaceutical interests in the United States of the parent company has been announced by Sterling Drug Inc., through James Hill, Jr., president. The new company, he said, will conduct the business hitherto carried on by Winthrop Chemical Company, Inc., now being liquidated, as well as the pharmaceutical operations of the Frederick Stearns & Company Division, Detroit, Michigan. A similar subsidiary to take over Winthrop and Stearns' Canadian business will be formed in the Dominion as soon as legal requirements are completed. Dr. Theodore G. Klumpp has been elected president of the new Winthrop-Stearns Inc., which will take over the extensive Winthrop manufacturing facilities at Rensselaer, N.Y., Glenbrook, Conn., and a newly-purchased plant at Myerstown, Pennsylvania.

* * *

A practical step to aid Great Britain in building up dollar credits and developing foreign trade between the United States and the United Kingdom is the keynote of the activities of the British Export Trade Research Organisation which maintains American offices at 1631 K Street N.W., Washington, D.C. Thus far, the organisation, which was formed by some 350 leading British exporting manufacturers after the end of the war for the purpose of obtaining trade information from other countries to assist the British exporter, has made some noteworthy contributions to solving the problem of foreign trade. The first step in this direction was the inauguration of a monthly publication to be called *British News—A Shop Window for the World*, to be issued by the trade research group and distributed monthly to some 10,000 American department, chain and mail order stores, wholesalers and big importers, telling them of the kinds of British goods available for export. The second was the announcement this week of a new free service designed to help American importers to find British sources for goods in which they are interested. The organisation is inviting inquiries from American importers, wholesalers, retailers and industrial buyers relating to all types of products where an overseas source of supply is required. The inquiries will be forwarded to the organisation's London office, 48 Dover Street, W.1, where they will be classified according to product and referred to British companies which have asked to receive such inquiries.

This is by no means a hit or miss affair, since American buyers are assured that their inquiries will be sent only to those British manufacturers in their field who have indicated that they are prepared to handle overseas orders. The British firms will reply direct to the American buyer. The British trade group has also arranged to assist United States businessmen visiting England to get in touch with British firms.

AMERICAN CHEMICAL SOCIETY SYMPOSIUM

Papers on Industrial and Engineering Chemistry

AT the recent meeting of the American Chemical Society some interesting papers in the symposium on unit processes in the division of industrial and engineering chemistry were read.

Messrs. Denton, Bishop and Nygaard, of the Socony-Vacuum Laboratories showed that by operating at the proper conditions, 2-nitropropane can be nitrated with nitric acid to give 2,2-dinitropropane, a valuable combustion modifier for diesel fuels. The optimum conditions are: pressure, 900 to 1200 lb. per sq. in.; temperature, 400° to 450° F.; molar ratio, one mole of nitric acid to one mole of 2-nitropropane when using 70 per cent nitric acid; space velocity, 1.0. Conversions per pass of 11 to 14 mole per cent of the 2-nitropropane charged were obtained under these conditions with ultimate yields of above 50 per cent. It was explained that for commercial exploitation more detailed yield and corrosion data are necessary.

Acetylation of Thiophene

A continuous process for the acetylation of thiophene was described by John Kellett and H. E. Rasmussen, also of the Socony-Vacuum Laboratories.

The liquid-phase acetylation of thiophene with acetic anhydride, giving acetic acid as by-product, it was pointed out, may be accomplished at temperatures of 100° to 400° F. by use of reaction times of from one hour to a few minutes, respectively.

A continuous process was described where in essentially complete conversion of acetic anhydride to product was obtained in a single pass, charging two moles of thiophene to one of acetic anhydride. The reaction temperature was about 325° F. and the reaction time five minutes. The catalyst was a 1.3 per cent concentration, based on total charge, of 85 per cent orthophosphoric acid in homogeneous liquid phase with the reactants. The excess thiophene was recovered and recycled.

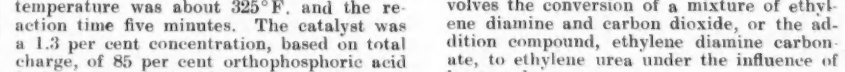
Ethylene Glycol Manufacture

The increased demand for ethylene glycol, chiefly for use as an antifreeze, has stimulated investigation of new methods of manufacture. One of these is based upon the vapour-phase oxidation of ethylene with air, followed by the liquid-phase hydration of the ethylene oxide to glycol in weakly acidic, aqueous solutions. In this investigation, "Vapour-Phase Hydration of Ethylene Oxide," R. R. Cartmell, J. R. Galloway, and J. M. Smith, a study was made of the possibility of carrying out the second step (the hydration reaction) in the vapour phase by passing ethylene oxide and steam over a solid catalyst, thereby eliminating the purification difficulties encountered in the acidic, liquid-phase process. Over a temperature range from 150° to 250° C. with acid-type catalysts, such as phosphoric acid on alumina, silica gel, thoria, etc., no glycol was obtained, although considerable quantities of aldehydes were formed in some instances. Silver oxide on an alumina carrier was found to be effective, conversions to glycol ranging from 20 to 30 per cent, with corresponding yield figures of about 80 and 40 per cent. The yield was affected by catalyst age, increasing to an approximately constant value of 80 per cent after about five hours of operation. The results suggest the possibility that with a new catalyst significant quantities of ethylene oxide are converted to a by-product which is held on the solid catalyst surface.

Synthesis of Ethylene Urea

In a paper on "The Development of a Process for the Synthesis of Ethylene Urea," John F. Mulvaney and Ralph L. Evans, of the Evans Research and Development Corporation, New York, point out that as it was apparent that large quantities of ethylene urea would be required as a chemical intermediate, an investigation of methods of synthesising it was begun in these laboratories in June, 1942, and completed in October, 1943.

Methods already described in the literature were tried but were ruled out on the basis of low yield and high cost. A new, general method for the synthesis of cyclic ureas was then developed. This reaction involves the conversion of a mixture of ethylene diamine and carbon dioxide, or the addition compound, ethylene diamine carbonate, to ethylene urea under the influence of heat and pressure.



A detailed study of this reaction on a small scale was made and the optimum conditions of temperature, pressure, and concentration of reactants were established. As a result of this study two processes, one a batch, the other continuous, were developed and carried through on a small pilot-plant scale. The process is surprisingly simple, easy to control, and requires no unusual or expensive equipment. Yields of 95 per cent

and better may be obtained; operating pressures are in the range of 400 to 900 lb. per sq. in., while temperatures range from 200° to 220°C.

The cost of ethylene urea by this process was approximately the same as the cost of the raw material, ethylene diamine.

Fluorine-Initiated Chlorination

In a report on chlorination initiated by fluorine, E. T. McBee and J. A. Bittles, of the Department of Chemistry, Purdue University, point out that it has been found that a small quantity of fluorine introduced into a mixture of chlorine and certain organic compounds will initiate chlorination. The method is applicable in both the liquid and vapour phase. For example, it was possible to achieve a high percentage chlorination of hydrocarbons when the organic material was dissolved in liquid chlorine.

The advantages of this method are readily apparent when considering the results obtained in the vapour-phase chlorination of ethane. A small stream of fluorine diluted with nitrogen was injected into a mixture of ethane and chlorine. The reaction could be carried out in an iron reactor at room temperature and be cooled by tap water if desired. By proper regulation of the fluorine, yields of chlorinated compounds between 95 to 100 per cent were obtained. These high yields were accompanied by a 95 to 100 per cent conversion per pass which made this specific process attractive. Besides ethyl chloride, there was formed a small quantity of dichloroethanes and a trace of trichloroethanes. The process was limited by the quantity of fluorine required for maximum yield and conversion; however, it has been found to date that a fluorine to chlorine ratio as small as 1 to 20 could be employed with satisfactory results.

Residual Fluorine Gas Disposal

In the symposium on fluorine chemistry a commercial plant for the disposal of residual fluorine gas admixed with hydrofluoric acid gas and nitrogen was described by R. Landau and R. Rosen, Standard Oil Development Co.

The process is a continuous one in which strong caustic soda was used as the absorption medium and the regeneration of caustic was accomplished by continuous treatment with lime, thereby precipitating calcium fluoride which was periodically discarded. The fluorine content of the exit gas from the system was very low, and no safety or medical problems were involved.

Operating data were presented which demonstrated the smooth and simple functioning of the system largely under automatic conditions and with low labour costs.

Red Phosphorus Production

A paper by Philip Miller, R. A. Wilson and J. R. Tusson described a continuous process for the production of red phosphorus developed in the laboratories of the Tennessee Valley Authority and which shortens the time required for conversion of white phosphorus to red phosphorus from days to hours over the commercial batch process. During the war a pilot plant embodying the continuous process was built and operated to produce red phosphorus of high purity for the War Department. In this process liquid white phosphorus was maintained continuously at its boiling point in a reaction vessel with a retention period of 5 to 6 hours, which converted from 30 to 50 per cent of it to solid red phosphorus. The resulting slurry overflowed continuously into a heated screw conveyor in which it was carried countercurrent to a stream of hot inert gas. The white phosphorus was vaporised and carried to a condenser, to be collected and recycled. Finely divided red phosphorus was discharged as the product and did not require treatment with boiling caustic or grinding, as in the batch process.

An additional advantage of the continuous process is its suitability for obtaining a product of high purity, needed in certain military applications.

POLISH CHEMICAL PRODUCTION

DURING the first six months of 1947 the Polish chemical industry achieved a production valued at £23,407,500, the major fields being:

Rubber articles	6,282,500
Artificial fertilisers ...	4,060,000
Organic chemicals ...	2,307,500
Inorganic chemicals ...	2,207,500
Coal derivatives	2,117,500
Oils and fats	1,407,500
Paints and colours ..	1,272,500
Explosives	1,207,500
Pharmaceuticals ...	885,000
Technical gases ...	745,600

Principal exports in the same period were carbide, caustic soda, arsenic, sulphur, ammonium chloride, zinc white, tar and dyes. These were shipped to U.S.S.R., Czechoslovakia, Jugoslavia, Bulgaria, Hungary, Sweden, Finland, Denmark, Holland, Switzerland, Argentina, Brazil, Palestine and the Russian zone of Germany. Artificial fertiliser production reached 370,000 tons of which 187,000 tons were nitrogenous and 183,000 tons phosphoric.

NEW PATENT PROCESS

HIGHER PRODUCTION OF GUANIDINE NITRATE

IMPROVED methods in the manufacture of guanidine nitrate are claimed by Koppers Co. Inc., in English patent 18857/1947, which deals particularly with the use of ammonium thiocyanide as starting material. Previous attempts had given yields of only about 50 per cent and in reacting the ammonium thiocyanide directly with the nitrate in molten admixture—whereby 100 per cent yield might be expected—there was risk of serious explosion. In the present invention this risk is eliminated and yields higher than 50 per cent are possible.

The method consists in reacting ammonium thiocyanide and ammonium nitrate in anhydrous ammonia solution at temperatures between 120 and 210° C. The reaction is presumed to be as follows:

$$NH_4SCH + NH_4NO_3 + NH_3 = CN_3H_5NO_3 + H_2S + NH_3$$

Explosion, within the temperature range used, is believed to be prevented by the ammonia blanket which remains in the system during reaction.

The hydrogen sulphide may be eliminated in many ways, *e.g.*, by stopping the reaction after a certain stage; separating sulphide and ammonia from guanidine nitrate, and then the ammonia from sulphide; and returning ammonia to reaction mass for further production of guanidine nitrate. Or excess ammonium nitrate may be used so that hydrogen sulphide is oxidised to elemental sulphur. Reaction time varies, according to conditions, from 2 to 24 hours. If excess ammonium nitrate is used, a lower temperature is preferable, otherwise the guanidine nitrate may be decomposed. Operation may be either batch or continuous, using an autoclave.

Differing Solutions

Ammonium thiocyanide and ammonium nitrate are both soluble in ammonia and form the well known Divers solutions. As an example, ammonium thiocyanide and at least equal molecular proportions of ammonium nitrate are dissolved in ammonia equal in weight to about half that of the two salts, placed in autoclave and heated. At completion of reaction the charge is allowed to cool, preferably in ice-water, then removed from the autoclave, and guanidine nitrate is crystallised out and filtered. The solution is then evaporated for removal of hydrogen sulphide and ammonia.

The recovered ammonia and residual unchanged salts may be returned to process. Pressures attained range from 130 to 275 lb./sq. in. Yields vary from 19 to 53 per cent, the lower figure being obtained with temperature down to 175° C. and pressure just under 200 lb./sq. in.

[In connection with this use of ammonia it is of interest to recall a recent discussion at Stanford Universty when reference was made to the increasing use of liquid ammonia as medium for chemical reactions, and especially to ammonolysis or reduction in ammonia solution. The case of nitroguanidine reduced to amino-guanidine was cited, together with others, by Dr. C. B. Wooster, chemical director of Ciba Products Corporation.—*Edit. Note.*]

NEW SCREENING METHOD

I.G. FARBEN INNOVATION

FREEDOM from grit is one of the essential requirements of organically-produced slurries, such as vat dye paste for printing. In printing, for example, the presence of hard particles of metal, glass or sand would damage expensive copper printing rolls. At the I.G. Farbenindustrie plant, Leverkusen, Germany, a novel screening device, said to be superior to vibrating screens, jet screens, fine grinding mills, and decanting equipment, has been developed for removing grit and coarse particles from slurries of organic chemicals. The operating characteristics and design details are fully described in a report just placed on sale by the Office of Technical Services, U.S. Department of Commerce, Washington.

Method of Operation

The device, mounted on a portable frame, consists of a vertical cylindrical metal vessel or bowl in which an inner concentric ring of fine screen is rigidly fastened. Inside the screen cylinder, a top-driven, close-fitting four-bladed impeller is rotated at variable but relatively high speeds. When the slurry is fed into the top of the inner screen cylinder, the impeller forces it through the screen partition into an outer collecting bowl from which the slurry flows into any convenient receptacle. The grit and coarse materials settle to the bottom of the inner receptacle. At the I.G. Farben plant the average output is said to be 1000 kilograms of screened slurry per hour.

The report, No. PB-77678 entitled "Screening Device for Slurries of Organic Chemicals," consists of eight mimeographed pages with two detailed drawings and is priced 50 cents.

Oxygen Speeds Steelmaking

Total Output Increased

THE use of oxygen in open-hearth furnaces as a means of stepping up U.S. production of steel is a subject of increasing interest and discussion among U.S. experts. Further light on the subject was provided at the recent convention of the Association of Iron and Steel Engineers held in Pittsburgh, the U.S. steel centre.

J. H. Zimmerman, of the Linde Air Products Company, New York, described intensive tests that have been made in many mills during the past year on the use of oxygen to speed up combustion of fuel, increase furnace temperatures and reduce the time required to melt scrap. Oxygen also has been bubbled through the molten bath in the furnace, it was reported, to speed carbon reduction and finish heats more quickly.

John Hornak, of the Carnegie-Illinois Steel Corporation, described experiments at his company's Homestead Works which indicate that the use of compressed air, rather than oxygen, provides similar results more economically

The wider use of oxygen in steel manufacturing depends on the production of the gas at a reasonable cost, H. W. McQuaid and F. E. Pavlis, of Air Products, Inc., Allentown, Pa., said. They reported that oxygen generators are now available to meet the needs of steel plants and declared that new developments have reduced prices to the point where oxygen may be used profitably in steel mills.

From 15 to 20 Tons

Meanwhile, in Cleveland, Ohio, the Republic Steel Corporation reports that by injecting oxygen gas into its open hearths it can raise production of steel from the normal 15 tons to 20 tons per hour. The "heat" time has been reduced with oxygen from the eleven to twelve hours by conventional methods to less than eight hours in experiments. Five more of the company's big 200-ton capacity open hearths have been equipped to use the gas, and other steel companies are engaged in similar experiments.

According to James L. Hyland, Republic's Cleveland district manager, several obstacles still remain to be overcome, but there is no question that oxygen can play a major part in speeding up production. He also said that the use of gas cuts the life of open-hearth roof refractories by about half. The cost of oxygen would have to be reduced to something under 25 per cent of its current price if its use is to be greatly expanded in steel-making.

Official Notices

Fertiliser Prices Rise

The following increases in the permitted maximum prices of fertilisers, to cover increased transport charges, are announced by the Board of Trade, with effect from October 4. Per ton—Sulphate of ammonia, 5s.; basic slag, 3s. national compounds, 3s.; c.c.f., 8s.; ground phosphate, 3s.; superphosphate, 3s. The increases in Northern Ireland *ex* "port place" or producer's works are: sulphate of ammonia, 5s.; basic slag, 3s.; superphosphate, 3s. The changes are authorised by S. R. & O. 1947, No. 2113.

Control of Iron and Steel

With effect from October 1 last, the Minister of Supply has made the Control of Iron and Steel (No. 60) (Scrap) Order, the Control of Iron and Steel (No. 61) Order and the Control of Bolts, Nuts, Screws, etc. (No. 14) Order. These Orders increase maximum prices for scrap iron and steel and most iron and steel products consequent upon the increases in freight rates and in the prices of coal and coke. Details of the new scales are contained in S. R. & O.s Nos. 2095, 2096 and 2097, 1947.

Duties Suspended

The Treasury has made an Order under the Finance Act, 1926, exempting alcohol furfuryl, and the ethyl ester diethyl sulphate (ethyl sulphate) from Key Industry Duty for the period October 4-December 31, 1947. The Order is entitled The Safeguarding of Industries (Exemption) (No. 7) Order, 1947 (S. R. & O. 1947, No. 2091) (H.M.S.O., 1d. net).

German Soap and Fats.—The Deutsche Fettsäure-Werke, Witten, formerly Imhausen & Co., has recently taken up manufacture of fatty acids. For the time being, 600 tons will be produced each month. The Krupp Motor Fuel Works at Wanne-Eickel is supplying the paraffin residue. Fats for technical purposes and soap manufacture are being produced initially together with limited quantities of edible fat. The firm of Julius Richter, jr., Bergisch-Gladbach, British zone, manufacturers of chemical-technical goods, mainly soap and soda, have been granted the so-called "great permit." It is now working at 80 per cent capacity and employs 300 workers. The O. Neynaber & Co., A.G., Bremerhaven, has commenced the manufacture of soap in co-operation with the firm of Gebr. Albrecht, Bremen. Manufacture of olein, stearine and cod-liver oil has been re-introduced.

TETRA-ETHYL-LEAD

NEW METHOD FOR DETERMINATION IN AIR

IT is well known that the vapour of tetra-ethyl-lead is highly toxic. Some authorities give the maximum permissible concentration in air as 0.01 mg. per 1 cu. m. It is necessary, therefore, that methods for determining it should be both accurate and sensitive. A new method of determining tetra-ethyl-lead in air given in the Russian journal *Gigiena i Sanitariya* (1945, 10, No. 9, 17-21), satisfies both conditions.

Existing methods of determining tetra-ethyl-lead, whether in fuels or in air, depend upon the decomposition of the molecule followed by a determination of the lead ion. Decomposition is attained by means of one of the halogens, or concentrated acid, or by a photochemical or thermal process. There are, however, objections to all the methods hitherto described. They involve a large number of operations and the possibility of errors at each stage. The best method appears to be that based on decomposition with alcoholic iodine solution. It is preferable to alcoholic bromine solution which is likely to be contaminated with sulphate and other impurities, while the action of chlorine in alcoholic solution is so vigorous that overheating and consequent loss may easily occur.

Too Complicated

Of the normal methods of determining lead, the dithizone method is most sensitive, allowing 0.001 mg. to be determined, but the necessary purification of the reagents is difficult, and the method appears too complicated under routine conditions. The molybdate method is sensitive to 0.005 mg. of lead, and the chromate and sulphide methods to 0.01 mg. of lead. In all cases, for determining tetra-ethyl-lead in air it appears necessary to carry out at the same time, identical operations with the sample and a standard, and the standard should preferably not be lead nitrate but a known amount of tetra-ethyl-lead.

In these methods two distinct operations are involved—decomposition of the tetra-ethyl-lead molecule, and determination of lead.

The new method is a direct determination; it is based upon the reaction with silver nitrate, whereby tetra-ethyl-lead, in large quantities, gives a copious black precipitate, and in small quantities, a yellowish brown colour, the intensity of which is proportional to the amount of tetra-ethyl-lead.

It is known that $-80°C$. silver nitrate reacts with tetra-ethyl-lead to give silver ethyl, as a very unstable compound:

$$Et_4Pb + AgNO_3 = AgEt + Et_3PbNO_3.$$

At $-35°C$. silver ethyl decomposes, giving metallic silver and free radicals. The application of the reaction to quantitative determination of tetra-ethyl-lead required a study of the effect of solvents. The author investigated various solvents and found that the most intense and clear colours were obtained in ethyl and butyl alcohols.

Results with Ethyl

With ethyl or butyl alcohol as a solvent it was found that: (1) the optimum quantity of 1 per cent aqueous or alcoholic silver nitrate to be added to 5 ml. of the alcoholic tetra-ethyl-lead solution is 0.05 ml., (2) addition of sodium hydroxide or aqueous ammonia solution in quantity insufficient to give silver oxide increases the intensity and brightness of the colour obtained; the sensitivity may be raised thus from 0.05 to 0.01 mg., (3) impurities, such as ethyl chloride and ethyl acetate, that may accompany the tetra-ethyl-lead in air, do not give the reaction and have no effect on it, (4) tetra-ethyl-lead vapour is easily absorbed by either ethyl or butyl alcohol; if the rate of flow of air does not exceed 40 litres per hour, and two absorbing vessels are used, the lead compound is absorbed mainly in the first absorbent, (5) tetra-ethyl-lead in the vapour state may be determined with an accuracy of $\pm$ 15 per cent.

Unsuccessful attempts were made to use a liquid solvent less volatile than ethyl or butyl alcohol, *e.g.*, glycerine and alcohol mixtures, petroleum jelly and butyl alcohol mixtures, dimethyl phthalate, and dibutyl phthalate. Silica gel was found to be effective in absorbing tetra-ethyl-lead, but the subsequent extraction gave incomplete yields, particularly noticeable when the amount absorbed was 0.1 mg. or less. Treatment of the silica gel containing the absorbed lead compound with alcoholic silver nitrate gave a brown stain but the colour was unevenly distributed over the surface. Previous treatment of the silica gel before use as an adsorbent with silver nitrate gave satisfactory results.

Purified silica gel was, therefore, ignited, soaked in 1 per cent alcoholic silver nitrate, then dried in the dark at room temperature, and packed into a glass tube, 4 mm. in diameter, and 70 to 80 mm. long. Small pieces of pure cotton wool were inserted at the ends. The silica gel so prepared darkens on being kept; it should therefore be used within a day.

When air containing tetra-ethyl-lead was passed through one of these tubes a yellowish brown ring appeared. Subsequent moistening with a few drops of ethyl alcohol developed a more intense brown colour.

Less British Machinery for Industry

Chemical and Textile Plant Excepted

THE Government's export plans were discussed by Mr. John Wilmot (then Minister of Supply), when he addressed members of the Engineering Advisory Council last week. Steel allocation to individual firms, he said, would be made on the basis of export performance, a policy which would have the effect of increasing restriction on machinery supplies for re-equipping home industries. There would also have to be some statutory form of output return from individual firms since the present voluntary system had proved itself inadequate.

Reviewing the progressive export targets for the engineering industry recently announced by Sir Stafford Cripps, and including such items as instruments, electrical goods, refrigerators, vehicles, ships, and rubber tyres, Mr. Wilmot said that the programme called for an increase in exports from £30 millions per month in the last quarter of 1947 to £42 millions per month in the mid-summer of next year, and £48 millions per month by the end of that year.

Turning to the question of iron and steel supplies to the engineering industry, the Minister said that while there would have to be increases to match the size of the export targets, any increase in *total* supplies were quite out of the question. "Increases in supplies of steel for export purposes," he continued, "will to a large extent have to be offset by a restriction in supplies for home production, including particularly capital goods of all kinds, building, civil engineering works and machinery. Having regard to the clamant needs of the undermanned industries such as textiles we cannot budget for an increase in output over the engineering industries as a whole, except such as will arise, we hope, from increased productivity and efficiency, for we cannot count on a much increased labour force in the engineering industries."

With regard to the field of specialist machinery, Mr. Wilmot agreed that the position here was more complex. In recognition of the fact that Britain had no alternative but to retrench heavily in capital investment, in many of the machinery using industries, desirable measures of re-equipment must be postponed or slowed down. "The extent of this diversion of output from home to export will vary of course with the different types of machinery," he continued, "and in the priority industries such as heavy electrical plant and coal mining machinery.

"Whatever programmes are fixed to meet home requirements will continue to be a first charge on output. In some other cases also certain types of textile machinery and chemical plant, home supplies of which would indirectly make an early and significant contribution to export in the hands of the textile and chemical industries—themselves most important export industries—we shall have to be particularly careful to find the best balance between home and export. But over much of the field, increased restriction in machinery supplies for the re-equipment of home industries is inevitable."

TETRA ETHYL LEAD (*Cont. from page* 505)

In any case the colour was much more intense than that obtained with untreated silica gel. The sensitivity with treated silica gel is such that 0.001 mg. of tetra-ethyl-lead may be detected after final moistening with alcohol; with untreated silica gel the amount has to be 10 to 100 times this to be detectable.

For quantitative purpose a series of standards was prepared. With 0.001 to 0.01 mg. of tetra-ethyl-lead, steps of 0.002 mg. showed distinct differences; with 0.01 to 0.07 mg., steps of 0.02 mg. were distinguishable, but with quantities of over 0.07 mg., the intensity was so great that no quantitative evaluation was possible. The standards were unstable, however, and artificial standards of water-colours on paper were prepared for greater convenience.

To determine amounts of the order of several hundredths of a mg. in 1 cu. m., the passage of 100 litres of air is necessary but the result is obtained by direct visual comparison with standards. With mg. and tenth mg. quantities the time required for a test is 5 to 15 minutes. The method is not applicable in the presence of carbon monoxide.

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New Petrol-Rationing Proposal

An alternative to the abolition of the basic petrol ration was proposed last week by Sir Miles Thomas, president of the Society of Motor Manufacturers and Traders. The scheme consists of allowing a much-reduced ration (of say half) sufficient to permit the motorist to operate his car within a 15-mile radius from any given point, such a centre being clearly mentioned in the ration book by the issuing authority.

Sir Miles claims that his plan is self-recommending since any policeman could check up on a motorist's activities at any time. Further advantages are that cars used for travelling to business could continue to be so used, and the housewife enabled to do a certain amount of shopping.

Micro-Analysis in Wartime Germany

"Semi-Automatic" Equipment

THE Germans, during the war, made no revolutionary advance in micro-analytical methods, but they introduced some modifications in quantitative analytical procedure which are worthy of study. This is the conclusion reached in the B.I.O.S. Final Report on micro-analytical methods (No. 715, Item 22; 1s. 1d., post free) based on very full information supplied by Dr. Karel Tettweiler, who was in charge of the analytical laboratories of I.G. Farbenindustrie at Elberfeld-Wuppertal.

As regarded laboratory and equipment in use, the laboratory was kept at a thermostatically controlled temperature of 20°C. The microchemical balances, mounted on the usual concrete shelves with dust-proof cases, were illuminated by tubular fluorescent lamps.

Tubular furnaces for combustion tubes were switched on automatically one hour before the staff arrived, so that work might commence without any delay. These furnaces were thermostatically controlled. The combustion tubes were all made from quartz and the movable heaters were moved automatically at an uniform rate.

Each apparatus had an arrangement whereby a bell rang when the movable heater reached the long burner so as to call the attention of the analyst, who then proceeded with the next step in the estimation.

Most of the modifications used in this laboratory are stated to be based on the time-saving methods recommended by Dr. Zimmermann, of the I.G. Ludwigshafen. In these methods, the personal element is reduced to a minimum in order that any one of assistant grade, possessing average ability, could quickly become proficient in carrying out analyses.

A number of methods are briefly described in this report, while full details may be found in the following journals: (i) The automatic micro-analytical estimation of carbon and hydrogen in industrial laboratories. W. Zimmermann, *Mikrochemie*, **31,** 149 (1943). (ii) The gasometric estimation of nitrogen in organic compounds. H. Gysel, *Helv. Chim. Acta*, **22,** 1088 (1939). (iii) The estimation of chlorine in organic compounds. The type of combustion tube used for this estimation—the substance is decomposed in the usual way either in a combustion tube or by the wet oxydation method of Zacherl and Krainick—is described by Wurzschmidt and Zimmermann, *Z.f. analyt. Chem.*, **114,** 6450 (1938). This tube is also used for the estimation of sulphur in organic compounds. (iv) The estimation of oxygen in organic compounds. J. Unterzaucher, *Ber.*, **73,** 391 1940). (v) The estimation of acetyl groups in organic compounds. E. Wiesenberger, *Mikrochem.*, **30,** 241 (1942).

CYANAMIDE AND MELAMINE : THE FRENCH PROCESS

IT is widely known that solutions of cyanamide can be obtained from suspensions of calcium cyanamide in water by precipitating with carbon dioxide or sulphuric acid, and distilling off the water. But there are various disadvantages including impurity of product. Now, by an invention of the *Soc. Anon. des Manufactures des Glaces et Prod. chim. de St. Gobain, Chauny, and Cirey* (English Patent 4000/1947), it is possible to obtain good yields of high purity cyanamide, dicyandiamide, or melamine, from solutions of cyanamide. Melamine may be obtained directly from cyanamide without passing through the intermediate dimer stage.

Calcium cyanamide in aqueous suspension, in the French method, is treated with sulphuric acid, carbon dioxide, or organic solvent or mixture thereof, and distilled *in vacuo* to eliminate water; it is then heated, and separated by filtration. The extract may be distilled at temperatures between 80° and 130°C., and dicyandiamide separated; or heated to 130°-300° C. and melamine separated.

Such solvents may be alcohols, ether oxides or salts, ketones, acids, etc. Polymerisation may be effected in the presence of auxiliary materials such as ammonia or amines, and operation may be batch or continuous.

Several examples are given, *e.g.* 200 kilos calcium cyanamide in powder form are placed in suspension in 1500 litres of water. Carbon dioxide is introduced, and the suspension agitated and cooled down to 40°C. or less. The carbon dioxide supply is stopped, and the *p*H should be such that bromothymol blue turns green.

The suspension is transferred to an extraction vessel where butanol—with carbon dioxide for agitation—is provided. By regulating the supply of butanol, cyanamide may be obtained at top of column. This solution is heated and distilled at slightly reduced pressure and at a temperature of 100°C. 47 kilos of crystalline dicyandiamide is thus obtained. The butanol may be used again continuously.

NEXT WEEK'S EVENTS

MONDAY, OCTOBER 13

Manchester Literary and Philosophical Society. Reynolds Hall, College of Technology, Manchester, 5.30 p.m. Dr. F. L. Rose: "New Anti-malarial Drugs."

TUESDAY, OCTOBER 14

Institution of Civil Engineers. The College, Library Street, Wigan, 7 p.m., Mr. A. Monk: "Open-cast Coal Production."

Royal Institute of Chemistry (London and S.E. Counties Section). County Technical College, Essex Road, Dartford, 7.15 p.m. Discussion on local activities. H. Baines: "The Chemist and the Photographic Industry."

British Sales Promotion Association. The Charing Cross Hotel, London, W.C.2, 6.30 p.m. Mr. L. D. Stewart, Home Sales Manager, Paints Division, I.C.I., Ltd.: "Planning of Sales Areas."

Institution of Chemical Engineers. Institution of Mechanical Engineers, Storey's Gate, St. James's Park, Westminster, S.W.1, 5.30 p.m. R. V. Southwell: "Relaxation Methods: A Mathematics for the Engineer" (Sixth Hinckley Memorial Lecture).

WEDNESDAY, OCTOBER 15

British Association of Chemists (Manchester Section). Engineers' Club, Manchester, 7 p.m. Mr. N. Sheldon: "Economic Security in the Chemical Profession."

Institution of the Rubber Industry (Southern Section). The Polygon Hotel, Southampton, 7.15 p.m. Dr. W. J. S. Naunton: "The Past, Present and Possible Future of Rubber Accessory Substances."

Society of Chemical Industry. Burlington House, Piccadilly, W.1, 6.30 p.m. The first meeting of the 1947/8 session. Mr. N. J. L. Megson: "Molecular Structure and its Influence on the Properties of the Phenolic Plastics."

Society of Chemical Industry. Chemistry Lecture Theatre, King's College, Newcastle-upon-Tyne, 5.30 p.m. Symposium on "Emulsions, Dopes and Paints." J. S. Gourlay: "Some Industrial Applications of Rheology"; T. Adamson and J. R. Stephenson: "A Brief Survey of Emulsions in the Surface Coating Industry"; J. Pryce-Jones: "On the Rheological Classification of Suspensions."

Institute of Welding (North London Branch). Enfield Technical College, Queensway, Ponders End, Enfield, 7.30 p.m. Mr. R. R. Sillifant: "Argon Arc Welding."

Royal Institute of Chemistry. Town Hall, High Holborn, W.C.1, 6.30 p.m. Mr. L. N. Coombs: "Personnel Selection."

THURSDAY, OCTOBER 16

Society of Chemical Industry, Chemical Society and **Royal Institute of Chemistry** (Liverpool Sections). Chemistry Lecture Theatre, University, Liverpool, 7 p.m. R. R. Butler: "Some Aspects of Industrial Administration."

The Chemical Society (Edinburgh Section). North British Station Hotel, Edinburgh, 7.30 p.m. Professor W. Wardlaw: "Modern Ideas of Valency."

Oil and Colour Chemists' Association. Royal Institution, 21 Albemarle Street, London, W.1, 6.30 p.m. Sir W. Lawrence Bragg: "A Review of Recent Advances in X-ray Analysis."

DUTCH QUININE FOR U.S.

The Amsterdam "Kina Bureau," central selling agency of numerous planters and manufacturers of cinchona, has recently offered the Reconstruction Finance Corporation (U.S.) 2.1 million oz. of quinine at a price not much above the pre-war level. At the same time it has become known that the export of cinchona bark from Ecuador—during the war the U.S. developed plantations and received large supplies from the Foreign Economic Administration (formerly U.S. Board of Economic Warfare)—has very much dwindled.

Last year it amounted to only 28,496 kg. compared with 827,886 kg. in 1945. Even of this reduced export, 55 per cent went to Holland, whereas in 1945 practically the total export was directed to the U.S. The above-mentioned offer will go a long way to meet the protests of well-known American pharmaceutical manufacturers against their "withholding" from the Cinchona Ledgeriana plantations of Java and the monopolistic policy of the Dutch in this field. Some of these manufacturers had urged Washington officials not to grant Holland any financial aid until U.S. buyers were allowed free access to the cinchona sources of the Preanger (Java). The American Government was further urged to maintain firm control over the import of this commodity.

"Enterprise Scotland" Closing Date.—The closing date of the "Enterprise Scotland" exhibition has been announced by Sir Steven Bilsland, chairman of the exhibition committee. Originally timed for September 30, the closing date has now been fixed for Saturday, October 18.

South African Chemicals

Good Prospects for Paint and Fertilisers

From Our Cape Town Correspondent

THE rapid development of South Africa's home chemical industry is reflected by a number of recent announcements and events in the Union. A typical example is the news that when the extension of the African Explosives and Chemical Industries' Natal plant is finished next year—at a cost of about £1 million—the plant will produce around 1000 tons of fertiliser daily and it will provide annually some 320,000 tons of superphosphate, four times the amount manufactured in South Africa in 1939. Total present output from all South African sources is less than 150,000 tons a year.

Other evidence of the continuing development are the statements that the new factory of the Capital Match Corporation, Ltd., at Bloemfontein will be in production possibly by the end of this year, and by the Shell Oil Company that it is now paying over £2 million a year to the Union Government in Customs duties and nearly £1 million to the South African railways.

Scope for Settlers

The Shell Company depends almost exclusively on South Africans for its staff—99.51 per cent are Union nationals—but in other spheres recent settlers are finding plenty of scope, especially in the development of newer techniques. This is fairly marked in the paint industry, which is now receiving some of the new machinery, much of which has been on order for upwards of three years.

Among the British settlers who have recently arrived in the Union are men with expert knowledge of the paint industry. Some of the laboratory chemists now employed in South Africa have arrived in this country since the end of the war. The industry is, however, still suffering a serious handicap in the shortage of raw materials, which are still hard to import, and supplies of tinplate are still scarce, as the bulk has to be earmarked for the food industries.

It is now hoped that most of these troubles will have been overcome next year. The general feeling is that as soon as all controls are lifted from the building industry there will be a building boom in South Africa in which the paint industry will share.

Higher Rhodesian Mineral Output.—The value of Rhodesian production of copper, zinc and lead and other minerals during the first six months of this year amounted to £12,848,604 as compared with £7,422,498 in the same period of 1946. Individual figures were as follows: Copper (blister and electrolytic) £11,495,238; zinc, £633,000, and lead £461,700.

St. Rollox Chemical Works

Its Contribution to Glasgow's Development

AN interesting talk was given by Mr. Ernest W. D. Tennent, joint managing director of C. Tennent Sons & Co., London, when he gave the second Tennent memorial lecture to the Glasgow section of the Society of Chemical Industry in that city recently.

He spoke of the old St. Rollox Chemical Works, now celebrating its 150th anniversary, which, he said, had contributed to the industrial development of the city of Glasgow. When the concern was first established at St. Rollox it lay in complete isolation, but it was now only a part of a large and busy industrial area.

Since 1840

Tracing the early history of the firm, Mr. Tennent said that by the year 1840 the works at St. Rollox were recognised as the most extensive and most important in Europe. For a time the works at Hebburn-on-Tyne had represented a challenge, but by 1875 the factories at St. Rollox had been extended by more than 50 acres. Exclusive of coal, more than 80,000 tons of raw materials were used per annum. An interesting production feature was that, while the annual output of bleaching powder rose to 10,000 tons, the price fell from £140 per ton to £8 10s. per ton. For 50 years the company's greatest rival had been Brunner Mond & Co., Ltd., but this rivalry ended when both firms were absorbed into Imperial Chemical Industries, Ltd. When the present race of Tennents had passed away, said Mr. Tennent, it would have left its name indelibly imprinted not only upon the history of Glasgow, but upon that of the social progress of the nation.

Five Generations

The passing of the old Chemical Works into other hands did not mean the end of the old Tennent companies, but rather freed them to embark upon other ventures, and the old companies in Glasgow, London, Liverpool, Belfast and Dublin were still expanding and flourishing.

Mr. E. W. D. Tennent, who represents the fifth generation in the family's business undertaking (his son, who has recently come into the business, is the first of the sixth), concluded his lecture by stating that if Government interference did not crush private enterprise, he had hopes that the various Tennent concerns would continue for another 150 years.

Alum-Earth Plant in Hungary.—One of the big investments in Hungary's three-year plan is the establishment of an alum-earth plant at Almasfüzitö in the Danubian region.

Scientifically Controlled Plastics Production

New Principles Applied at a Tynemouth Factory

THE factory newly completed by De La Rue Insulation, Ltd., at West Chirton, Tynemouth, represents development at a level seldom reached before of the principles of automatic control of vital processes and of automatic recording which permits consultation at any time of all the relevant conditions in which a particular batch of insulating material was produced.

The value of such records and controls in providing the fullest data about processes and procuring absolute uniformity of production is reflected by the fact that many thousands of pounds have been spent on the instrumentation alone.

Varied Plastics Products

The factory, which has now started production, was completed by Sir Robert MacAlpine & Sons in just over two years. It is a major enterprise covering 170,000 sq. ft. and is devoted to the expanded production of laminated plastic materials, "Formica," "Traffolyte" and "Delaron," with departments for the manufacture of plastic extrusions, insulated sleevings and electrical connecting wires.

The specification and engineering of the equipment were the result of co-operation between De La Rue's technical department, Mr. K. W. West, of the Bristol Instrument Co., Ltd., and the various plant contractors, Carrier Engineering Co., Ltd., W. J. Fraser & Co., General Engineering Co., Ltd., L. A. Mitchell, Ltd., and J. Shaw & Sons, Ltd.

The important and characteristic development is the incorporation in all the plant of recorders which automatically and continuously record over a period of 24 hours the conditions of temperature and pressure in the various parts of the plant, so that at any time a check can be made as to the actual conditions under which any given piece of material was processed.

On the 100-ft. long impregnating machine the paper or fabric first passes through a pre-drying chamber, the temperature of which is automatically controlled, to ensure that the material is in an ideal state to receive the impregnating resin.

The material then passes through a resin bath which is automatically temperature controlled by either a heating or cooling medium according to requirements to maintain within close limits the correct viscosity of the resin to suit the particular grades of resin and material.

It next moves into the oven proper which is automatically temperature controlled at several points along its length to maintain the required gradient of temperature for the correct processing of the resin impregnating material.

On the vertical impregnating machines the material again passes through an automatically temperature controlled pre-drying chamber, a temperature controlled resin bath and the several temperature controlled zones of the drying oven.

Polymerisation Under Pressure

The large multi-daylight hydraulic presses are equipped with a co-ordinated control panel, specially designed for this particular process and incorporating automatic control of pressure, temperature and time. From his control desk the operator remotely operates the control valve which causes the press to close and applies hydraulic pressure. This hydraulic pressure is automatically controlled at any pre-determined value according to the specific requirements of the particular type or grade of board being pressed. When the operator presses a start button on his control desk the instruments automatically turn on the heating medium and control the temperature rise of the press at a pre-determined rate.

When the cycle temperature has been reached it is maintained for the required length of time after which the heating medium is shut off and the cooling medium allowed to flow through the press. This condition is maintained for a pre-determined period until the board is sufficiently cooled, when the process is automatically stopped.

Automatic Controls

In spite of the number of operations performed and the number of valves to be operated, the sole responsibility on the operator for the performance of these functions is that of pressing the start button.

To permit stable conditions of the resin baths the heating medium is supplied from a special low temperature calorifier which in turn is automatically temperature controlled.

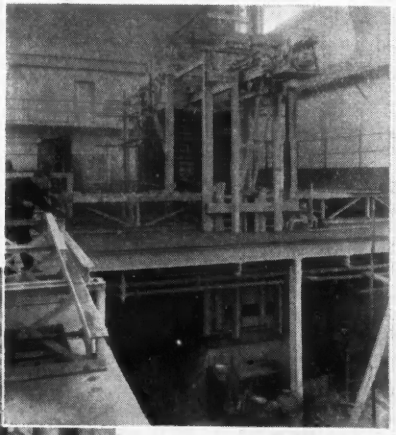
The large special resin still has another co-ordinated control panel designed for this particular process. The instruments automatically control the rate of temperature rise at the beginning of the reacting stage, automatic control of cooling in the case of excessive exothermic reaction, automatic change-over to any of several thermocouples to check uniformity of temperature of the charge, continuous recording of the various important temperatures and pressures.

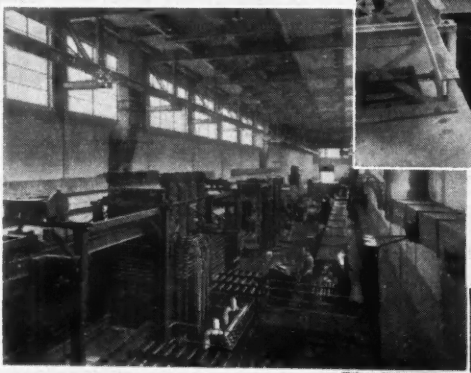
All the resin blenders are automatically temperature controlled by a heating or cooling medium to ensure the maintenance of the correct blending temperatures for particular resins. Similar equipment to rule out the possibility of inadvertent departure from the ideal temperature is, in fact, a feature of all the processing plant.

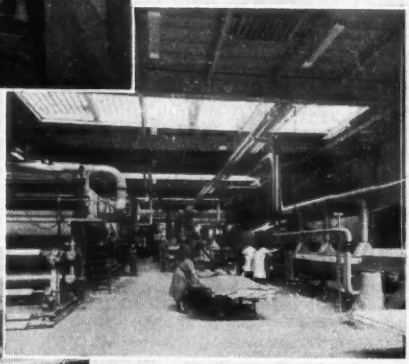
MODERN PLASTICS PRODUCTION

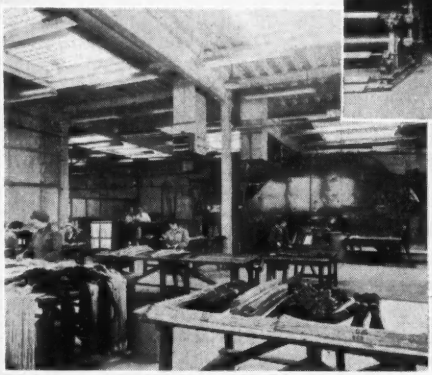
Right: Installing at Cherton the 5,000 ton press, largest of its kind in the world

Below: A view of the press gallery and, in the foreground, the new press for producing laminated plastics









PROCESSING AND INSPECTION

Above: Here paper and other materials are impregnated with synthetic resins under scrupulously controlled conditions

Left: The final stage of inspection of the completed lengths of insulating material

Prejudices Must Go

I.C.I. Chief's Plea for Collaboration

PRESENT on the occasion of the 10th anniversary dinner of Plant Protection, Ltd. (an I.C.I. subsidiary) in London last week were Lord McGowan, the I.C.I. chairman, Mr. Harold Wilson, President of the Board of Trade, Mr. W. J. Jordan, New Zealand High Commissioner, Mr. S. W. Cheveley, Plant Protection managing director, and others.

Chief speaker of the evening was Lord McGowan, who in proposing the toast "Export Trade" had no doubt fully considered the identities of the guests, their responsibiliies, and their problems.

The Facts

"It is for leaders of industry, in addition to what Cabinet Ministers may say," he asserted, "to get at the inner consciousness of their workers to tell them that our standard may be lowered if higher production is not forthcoming. I do not believe that the severity of the crisis is sufficiently appreciated by the majority of our people, and it must be brought home to them," he continued. "It can be done by bringing our workers more into our confidence and making them feel that they are part of an indivisible team. It may be slow, but that should not disturb us.

"The crisis we are now facing will give us opportunity of getting rid of ancient customs and prejudices; we should endeavour to integrate industry properly; above all, we must become more and more efficient."

Good Prospects

Referring to the effects of the war on countries previously concerned with the production of primary materials, Lord McGowan said that such countries had naturally turned to the development of secondary enterprise. He continued: "They may say, 'never again shall we be caught with our pants down.' This need not give us cause for undue anxiety. While there may be a temporary lessening of exports of certain kinds of goods from Britain there is much latent consumption power throughout the world justifying a higher and higher production.

"I am convinced that we have in British industry men of sufficient vision and drive to lead us into new and lucrative ventures."

A.B.C.M. Dinner Cancelled

In conformity with the Government's wishes, the annual dinner of the Association of British Chemical Manufacturers, due to be held on Thursday, October 9, 1947, has been cancelled.

Importance of Lithium

Expansion of Manufacture

WRITING in *The Scotsman* of October 2, Dr. James Lawrie draws attention to the growing importance of lithium to industry, and remarks upon the recent expansion in its manufacture and use.

Of importance in air-conditioning plants, and in the dehydration of food, is lithium chloride, which is claimed to have water-absorbing properties greater than any other known salt. In solution—it is stable at ordinary temperatures— it absorbs water, a number of vapours such as ammonia, and tobacco smoke, etc.

In foundry work, blast furnaces and cupolas give a greater production—often as much as 15 per cent—where lithium has been used for air conditioning the intake. According to Dr. Lawrie, fluoride of lithium, an insoluble and non-water absorbing material, may play a unique part in the composition of aluminium welding fluxes.

Lubricating greases possessing exceptional water-resisting properties have been obtained from lithium stearate soaps. Operating ranges for these greases are said to lie between −60° and 320°F. Yet another use for lithium stearate is in the simulation vegetable and mineral waxes. Some paraffins in admixture with lithium stearate form a gel which results in a wax possessing the properties of some of the expensive waxes. These may ultimately be used for the manufacture of cosmetics, crayons, polishing waxes, printing inks and insulators for electrical equipment.

Canadian Chemists Object

The Chemical Institute of Canada has raised strong objection to the ranking of professional chemists substantially below engineers of comparable training and experience in recommendations on salary scales by the Canadian Public Health Association. The Association's Committee on Salaries and Qualifications of Public Health Personnel produced the document earlier this year in aid of better remuneration and working conditions for public health officers.

The Institute has pointed out that "there is apparently a lack of appreciation of the capabilities and responsibillities of the professional chemist, as contrasted to the professional engineer"; and further that "This Institute sees no reason why a professional chemist should earn less than a professional engineer of comparable training, experience, and ability, and it views with very much concern any document which implies or suggests that such salary differentials should exist."

A CHEMIST'S BOOKSHELF

The Welding of Plastics. By G. Haim and H. P. Zade. London: Crosby Lockwood & Son, Ltd., 1947. pp. xi + 206. 21s.

The ever increasing literature on plastics is usefully enlarged by this book dealing exclusively with the welding of these materials. Although extensive studies of this subject have appeared in many publications, this recently developed process is now presented for the first time in a book which reviews progress from the beginning. The methods and equipment used for the welding of plastics resembles those for welding metals; the basic principles, however, are rather different. Here is a complete survey of the theory and practice of welding plastics, a field which the authors have followed since its development and which they have partly developed themselves. The book describes the whole subject in 17 chapters, beginning with the chemistry and physics of weldable plastics and their technology. The various welding processes, such as hot gas welding, high frequency welding, and other friction and flame weldings, etc., are described in separate chapters and other chapters are devoted to welding machinery, to industrial application and to the training of welders. Each chapter gives references to its text and also additional references on the respective subject. A glossary of terms used, quick tests for the identification of thermo-plastics, an index of trade names of commercial thermoplastics, a patent, name and subject, index and many tables, diagrams and 88 figures make the book a comprehensive and useful guide for technicians of all classes in this new field.

Elements of Physical Chemistry. By Samuel Glasstone. Third edition: pp. 695. 1947. D. Van Nostrand & Co., Inc., New York, and Macmillan & Co., Ltd., London, 25s.

This, as its name suggests, is a book for the student, but, so wide is its scope and so fundamental is its treatment that it should appeal equally well to those requiring a sound introduction to the principles of physical chemistry. Some, in fact, will see in this revised edition of the volume first published in March, 1946, a more useful aid for the latter class of reader than it is likely to be for the student chemist, whose need to-day to specialise this extremely far-reaching survey of subjects which normally require much more detailed treatment will not satisfy. Assuming, however, that the student is not deceived by the simplicity of the summary into which his own particular subject has been compressed, the remainder will serve as an extremely able review of other fields with which he may expect to come in contact later. Best of all, the information provided here is more than usually up to date and that clearly is, second to accuracy, the primary requirement of any study involving the nature of the atom and the laws of the behaviour of materials which proceed from it.

British Association Addresses

Sir Henry Dale's authoritative and well balanced study of the effects of wartime stimuli on science as a whole and of the peaceful applications of war-developed processes, the presidential address to the British Association for the Advancement of Science, introduces the volume in which the association has collected the addresses of the presidents of the various sections presented at the annual meeting of the association in Dundee in August and September. It costs 6s.

LETTER TO THE EDITOR

SIR,—The president of the Board of Trade recently informed industry that production for export must be given first priority in the supply of fuel, raw materials and labour.

There are many producers in the chemical and allied industries who have not hitherto explored the possibilities of an overseas market for their products, and consequently possess neither contacts with overseas buyers nor an experienced selling organisation.

May I suggest to those producers that the services which they require can be found among the established British merchant exporters, who, by their own enterprise and supported by specialised knowledge are endeavouring to re-establish the British trader in the markets of the world. The Chemical Traders' Export Group would gladly assist producers who are seeking the services of an export merchant.—Yours faithfully,

(Signed) F. G. W. PAIGE,
Secretary of the Chemical Traders' Export Group, 4 Lloyd's Avenue, London, E.C.3.

Home News Items

Advanced Rheology.—Commencing on Tuesday, October 28, a course of six lectures on advanced rheology will be given at The Polytechnic, Regent Street, by Dr. G. W. Scott Blair.

I.C.I. Portraits.—Portraits, paintings and drawings, which were commissioned by Imperial Chemical Industries, Ltd., for use in their advertising are at present being exhibited in the Kelvingrove Art Galleries, Glasgow.

Blaze at Reading Chemical Works.—The destruction of large quanties of chemicals was averted by the promptitude of the firemen when fire broke out last week at the Reading factory of Bradley and Bliss, Ltd., manufacturing chemists. Some ether exploded soon after the staff were evacuated and other explosions were narrowly averted.

More Wage Demands.—A minimum wage of £7 per week for underground workers, and £6 10s. per week for surface workers, representing in some cases an increase of as much as £2 per week is to be demanded by the National Union of Mineworkers. A special sub-committee has been set up by the union to draft the application.

Centenary of Chloroform.—The centenary of the discovery of chloroform by Sir James Simpson, will be celebrated in Edinburgh on Tuesday, November 4, when a scientific meeting to discuss the present use of chloroform will be held in the lecture room of the Surgery Department, University New Buildings, Teviot Place, Edinburgh. Papers will be read by Professor R. R. Macintosh, Dr. D. S. Middleton, and Dr. John Gillies.

Fire at Chemical Works.—A fire which broke out at the works of Silverwood Chemicals, Brixton, London, early on Tuesday morning last week destroyed valuable plant and equipment, and threatened adjoining dwellings. N.F.S. detachments from six London boroughs managed to control the outbreak, however, and local residents who had been ordered from their homes as a precautionary measure were later allowed to return.

U.N.O. Press Conference.—At a Press conference held in Russell Square House, W.C.1, last week, Mr. E. Wyndham-White, executive secretary of the Preparatory Committee of the United Nations Trade and Employment Conference, spoke on the conclusion of the I.T.O. talks in Geneva, and the forthcoming conference at Havana on November 21. He disclosed that of the 50 or 60 nations that had been invited, only Soviet Russia had intimated an intention not to attend.

Change of Name.—Messrs. Polish Trading Co., Ltd. (exporters of chemicals and metal products), advise that, with Board of Trade consent, the company's name has been changed to Copthall Trading Co., Ltd.

Coal Reserves.—Coal supplies for electricity undertakings in the north-west are now above the five weeks' average and should "see us through if we get a winter of even reasonable severity." Mr. George Gibson, chairman of the North-West Regional Board for Industry, made this statement in Manchester on September 22.

New Factories in Cheshire.—The production of alloys, paint, fatty oil processing and the reconditioning of steel drums are the objectives of four of the five factories projected at the Bromborough (Cheshire) industrial estate for which building licences are being sought. Work has also begun on a factory for Raymond Electric, Ltd.

A New Pit for Kent.—Kent, which is the nearest coalmining county to London, may have an addition to the existing collieries of Betteshanger, Tilmanstone and Chislet. The National Coal Board is believed to have under consideration a plan to sink a pit near Aylsham, in the Wingham-Addisham district.

Works Production Aid.—An exhibition at the British Enka Factory, Aintree, Liverpool, last week demonstrated to employees how their output of rayon is converted into products ranging from clothing and fabrics to motor tyres, to fulfil the Government demand that the rayon industry should increase exports by 390 per cent, nearly four times the pre-war rate.

Stove Enamel Tests.—The British Standards Institution has published a provisional British Standard for performance test for protective schemes embracing stoving paints used for the protection of light-gauge steel and wrought iron against corrosion, B.S.1391. A questionnaire will later be issued to those applying the test to determine whether it is suitable to be applied permanently.

Guest Keen Transfer.—In accordance with the plan for the modernisation of the tinplate and sheet industries in South Wales and the formation of the Steel Company of Wales, Ltd., Guest Keen Baldwins Iron and Steel Co., Ltd., have agreed to transfer the undertakings previously carried on by them at Port Talbot and Margam Works to the Steel Company of Wales, Ltd. The formal transfer of assets took place on September 27.

PERSONAL

MR. J. H. JOLLY has been elected chairman of Guest Keen & Nettlefolds in succession to SIR SAMUEL R. BEALE, who has retired but who is to retain his seat on the board. Sir Samuel is to retain his chairmanship of Joseph Sankey & Sons.

MR. B. B. MORTON read a paper entitled "Metallurgical Methods for Combating Corrosion and Abrasion in the Petroleum Industry" at the Institute of Petroleum on Ocober 8.

MR. ROBERT FOOT, chairman of Powell Duffryn Technical Services, Ltd., left by air for Australia on Saturday last. He will discuss the further development of coal resources in the Dominion.

MR. R. A. PLUMMER, chairman-designate of the Overseas Food Corporation, has recently left this country to undertake development work in connection with the Empire groundnuts scheme.

Powell Duffryn Chairman

Tributes to the work for the Welsh National Council of the Y.M.C.A. in the past 25 years by Mr. Edmund L. Hann, chairman of the Powell Duffryn Company, were paid at a luncheon at Cardiff last week at which presentations were made to Mr. Hann to commemorate his many gifts and services to the Union of Y.M.C.A. Boys' Club.

DR. W. T. H. WILLIAMSON, Agricultural Director of the British Council since 1945, and at one time chief chemist to the Ministry of Agriculture in Egypt, has been appointed lecturer in charge of the newly-created department of soil science at Aberdeen University.

MR. ST. JOHN ELSTUB has left the Ministry of Supply, Rockett Propulsion department, Westcot, Bucks., where he was deputy chief superintendent, to rejoin Imperial Chemical Industries, Ltd., as assistant chief engineer of the metals division.

MR. A. T. GREEN, Director of Research of the British Refractories Research Association and the British Pottery Research Association, has been appointed hon. general secretary of the British Ceramic Society in succession to the late Dr. J. W. Mellor.

MR. F. H. S. MCDAVID has resigned from the joint managing directorship of Brotherton & Co., Ltd., and from its board of directors. MR. GEORGE BREARLEY has been appointed managing director, and MR. GEORGE BROTHERTON-RATCLIFFE has joined the board.

Obituary

PROFESSOR MAX PLANCK, the famous German physicist, noted for his quantum theory, has died at Gottingen, aged 89.

OFFICERS OF IRISH CHEMICAL ASSOCIATION

AT the recent annual general meeting of the Irish Chemical Association in Dublin, the following officers and Council were elected for the 1947-48 session: President—PROF. T. S. WHEELER; vice-president—PROF. E. J. CONWAY, F.R.S.; hon. sec.—MR. G. F. O'SULLIVAN; hon. treas.—MR. J. BELTON; Council—MR. V. C. BARRY, MR. T. W. BRENDAN, MR. D. CROWLEY, MR. B. G. FAGAN, MISS M. MACNEILL, MR. D. V. NOWLAN, and MR. D. O'TUAMA.

German Patent Law

THE Chamber of Technic in Berlin has just published the drafts of a new German "Patent Law" and a "Law for Furtherance of Inventiveness," both of which are to form the basis for pending negotiations at the Chamber.

It is suggested that two different categories of patent rights should be created, the first to conform to the old German patent law, and the second to safeguard the interests of the "little man," who will receive an "Inventor's Certificate." He will not have to pay annual fees, and the certificate, it is suggested, should be granted only to the inventor personally. In such cases, the Patent Office reserves the right to utilise the invention, which it may test in its own laboratories at its own expense. The patent Office may ultimately grant licences for the utilisation of such an invention on the understanding that the inventor reaps the benefit.

In the event of a patented invention not being utilised within three years, invitations may be extended to third parties to apply for utilisation licences.

It is understood that no existing German patent will lose its validity under the new law, which has yet to be considered by the Allied Control Council. A Military Government spokesman for the North Rhine-Westphalia district, who recently urged German firms not to make known new ideas because patent rights are not as yet protected, has predicted that the new patent law might be accepted before the end of 1948.

Better Coal Total.—Coal production in the week ended September 27 represented a small increase, notwithstanding a small reduction in output of deep mined coal. The overall total was 3,901,800 tons, comparing with 3,896,300 in the previous week and 3,788,100 in the corresponding week last year.

Overseas News Items

Uranium and Thorium in N.Z.—Uranium and thorium is to be separated from gold dredge trailings and sands in New Zealand.

Asbestos Project in Australia.—Wittenoom Gorge, situated in the Hammersley Ranges of Western Australia, is reported to be the scene of extensive mining operations for blue asbestos.

U.S. Copper Production.—Production from the Ergeni mine, at present the only Turkish copper producing mine, is reported to have totalled 10,050 tons of blister copper last year. The entire output for the current year is already stated to have been allocated.

World Tin Allocations.—Additional allocations of 553 tons of tin metal for the second half of 1947 have been granted by the combined Tin Committee to Australia (150 tons), New Zealand (129 tons), Ceylon, Egypt, Finland, Ireland, Palestine and Jugoslavia.

Fiat to Make Resins.—The Italian Fiat Company is building a large pilot plant for the manufacture of synthetic resins at Porto Marghera. The technique of this branch of industrial chemistry has been completely revolutionised in Italy during the war.

Copper Ore in Czechoslovakia.—Geologists are of the opinion that some Slovakian deposits contain considerable quantities of copper ore, soderite and silver. A refinery is to be set up for the testing of the various seams of the mineral deposits near the town of Banska Bystrica.

Stainless Steel Paint.—Stainless steel powder mixed with paint, spar varnish and lacquer, increasing the life-time of a painted surface by as much as 300 per cent, is finding rapid industrial and domestic acceptance in the United States. The new material is furnished to customers in paste form which, when mixed with lacquer, varnish, or any other so-called paint "vehicle," will render a surface highly resistant to corrosion by chemicals. The material, available commercially, will soon be sold also in the form of flakes.

New U.S. Standards Bureau.—An independent agency for sampling, testing, and certifying materials and products to aid consumers, distributors and producers has been organised in New York under the title of American Standards Testing Bureau, Inc. with an address at 44 Trinity Place, New York City. It is a fact-finding organisation concerning itself with standards and standardisation, and is staffed with specialists in methods of preparing, sampling and testing the application of specifications, and developing test procedures.

Pakistan Industrial Projects.—According to a spokesman of the Dominion of Pakistan, a large-scale prospecting programme for petroleum, coal and iron-ore deposits is soon to be carried out.

Aluminium Industry for N.Z.—A representative of Aluminium, Ltd., of Canada, recently arrived in New Zealand to investigate the possibilities for the establishment of an aluminium industry.

U.S.A. to Tax Scrap Imports.—The U.S.A. is re-imposing, as from July next year, the collection of duties on imports of scrap iron, scrap steel and non-ferrous metal scrap. Collection of these duties was suspended during the war.

More Italian Mercury.—By the reconstruction of the works at Monte Amiata, Italy, now at an advanced stage, it is hoped to turn out 2500 tons of mercury annually. Present local consumption does not exceed 100 tons, and a considerable margin should be available for export.

Metal-Distinguishing Device.—According to a recent report from the U.S.A., a leading concern there has developed an electronic device which is said to be capable of differentiating, not only between one metal and another, but also between various grades of the same metal.

U.S.S.R. to have Large Gas Liquefaction Plant.—Dresser Industries, Cleveland, Ohio, is reported to have signed a contract with the Soviet Government for the erection of a gas liquefaction plant south of the Russian capital. Daily capacity will be 4 mil. cu. ft. of natural gas, while there will be storage facilities for 1,620,000,000 cu. ft.

Coal Deposits Discovered in the Tyrol.—Occurrences of good quality coal are reported to have been found, as the result of geophysical investigations, in the Keesen-Walchsee area of the Tyrol. Reserves are estimated at about 20,000,000 metric tons. Preparations for their exploitation are in progress and it is hoped to mine 600 tons per day in three shifts.

German Glassware for India.—According to a recent announcement in *The Indian Trade Journal*, a technical glassware-manufacturing firm in the Russian zone of Germany is preparing to export various types of laboratory and similar equipment to India. The list includes tubes, flasks, gas regulators, gas-washing bottles, syphons, stopcocks, taps, condensers, funnels, thermometers, pumps, hydraulic presses, water hammers, weighing bottles, and various kinds of graduated measuring instruments.

Company News

The nominal capital of **British Xylonite Company, Ltd.,** Hale End, London, E.4, has been increased beyond the registered capital of £700,000, by £300,000, in £1 ordinary shares, 300,000 ordinary shares have been converted into stock.

Erinoid, Ltd., manufacturers of substitute material for ivory, bone, and tortoiseshell, has announced a trading profit of £180,400, an increase of £47,000 over last year. Stockholders are to receive a distribution of 20 per cent, including a 5 per cent cash bonus.

P. B. Cow and Co., rubber and plastic manufacturers, has declared an interim dividend on the £410,000 ordinary stock of 12½ per cent on account of 1947. This is in accordance with the directors' statement in the recent offer for sale of 250,000 4s. units.

Lancegave Safety Glass (1934), a subsidiary of Triplex Safety Glass Company, is paying a dividend of 10 per cent, less tax, for the 15 months ended June 30, 1947. This is the first payment since the 10 per cent distribution for the year to March 31, 1938. Net profit for the 15 month period was £15,471, compared with £11,761 for the previous 12 months.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

HARYDE PRODUCTS, LTD., Newcastle-on-Tyne, manufacturing chemists. (M., 27/9/47.) August 15, £1000 debenture to V. C. Booth, Brierley Hill; general charge. *Nil. December 31, 1945.

FINE DYESTUFFS & CHEMICALS, LTD., Manchester. (M., 27/9/47.) August 14, £12,000 mortgage to A. B. Fleming & Co., Ltd.; charged on land with warehouse thereon at Manchester.

TOWER LABORATORIES, LTD., London, W.C. (M., 27/9/47.) August 11, letters of authorities, securing £1850 to J. Florsheim & Co., Ltd.; charged on certain book debts. *—. December 31, 1946.

BAKER RESEARCH LABORATORIES, LTD., London, S.E. (M., 11/10/47.) September 3, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; charged on 9 St. Mary Street, Canning Town.

MODY & CO., LTD., Manchester, manufacturing chemists. (M., 11/10/47.) September 1, charge, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; charged on land and buildings known as Ulster Factory, Long Lane, Orford, near Warrington. *Nil. December 31, 1945.

Satisfactions

LANGLEY ALLOYS, LTD. (Bucks). (M.S., 11/10/47.) Satisfaction August 28, of mortgage registered November 18, 1942.

VINYL PRODUCTS, LTD., Carshalton, chemical manufacturers. (M.S., 11/10/47.) Satisfaction September 1, of charge registered December 19, 1945.

TYNE CHEMICAL CO., LTD., South Shields. (M.S., 27/9/47.) Satisfaction August 11, of charge registered July 26, 1945.

Chemical and Allied Stocks and Shares

SIR STAFFORD CRIPPS' reference to the possibility of further "cuts" in imports affected sentiment in stock markets where business remained on very moderate lines. Nevertheless, there was again little selling and, despite continued talk of another Budget next month with some new form of E.P.T., industrial shares were generally well maintained. On the other hand, British Funds were more active, but lower, the national savings figures being disappointing.

Chemical and kindred shares were generally quite well maintained, although Imperial Chemical at 47s. 3d. lost a small part of an earlier advance. Monsanto Chemical 5s. shares at 57s. moved higher on balance, buyers coming in owing to current dividend estimates. Greeff-Chemicals Holdings 5s. shares were 15s. 6d. Fisons have been active around 66s. 6d., W. J. Bush remained firmly held and quoted at 90s. with B. Laporte 78s. 9d. Elsewhere, Major & Co.'s 2s. shares were 4s. There was again a good deal of activity in Distillers in anticipation of the share splitting; the £1 units rose further to 142s. Turner & Newall have been steady at 72s. 6d., United Molasses strengthened to 49s. and Wall Paper Manufacturers' deferred to 43s. 9d. in response to hopes of an increase in the forthcoming dividend.

Borax Consolidated were 54s. 4½d. with British Oxygen 94s. 4½d., while British Aluminium firmed up to 45s. 9d. Triplex Glass 10s. ordinary at 32s. 9d. lost part of

the good rise which followed the improved results and higher 10 per cent dividend. Colliery shares, such as Horden and Bolsover, were favoured, the assumption being that in many instances current market prices are moderate in relation to the eventual compensation payments. Paint shares were good in response to prospects of export trade expansion which, it is said, will be helped by the substitutes for linseed oil. Pinchin Johnson improved to 60s., International Paint were £6¾, Goodlass Wall 38s. 3d. and Sherwoods Paints 26s. 10½d.

Iron and steels were favoured in view of the good yields, the assumption being that dividends should be well maintained and that nationalisation may be deferred indefinitely. Dorman Long preferred were good at 45s., Neepsend strengthened to 33s. 9d., in anticipation of the dividend, John Summers rose to 29s. 9d. following the interim payment, while, in response to the higher profits and maintained 8 per cent dividend, United Steel improved to 26s. 10½d. Following the higher payment, Imperial Smelting have strengthened to 21s. Amalgamated Metal were 16s. 9d., but, elsewhere, Dunlop Rubber eased slightly to 72s. General Refractories have been steady at 21s. Murex improved to 86s. 3d.

Textiles became less active, although, generally, recent gains were well held, Bradford Dyers being 22s. 7½d., Calico Printers 21s. 7½d. and Bleachers 10s. 10½d. The building group eased with Associated Cement 63s. 3d. and British Plaster Board 25s. 3d. In other direction, Griffiths Hughes rallied to 43s. 9d., Beechams deferred were steadier at 24s. 9d. with Sangers 30s. 3d. and Timothy Whites 44s. Glaxo Laboratories rallied and, although best levels were not held, were higher on balance at £20¾. British Drug Houses 5s. ordinary have changed hands around 12s. 3d. Oil shares were affected by latest international news, Burmah Oil coming back sharply to 71s. 3d. with Shell 82s. 6d. and Anglo-Iranian £8 5/16. Later, however, there was a good rally, Anglo-Iranian rebounding to £8 9/16.

British Chemical Prices

Market Reports

NO changes of any importance have taken place in the past week and values generally are firmly held at recent levels. The overall supply position has shown no marked improvement, and spot transactions are difficult, and for many products impossible, to negotiate. Any increase in production is expected to be taken care of by the expanding home consumption and the export demand, and, therefore, we must be prepared to see a continuation of the present tight conditions for a considerable time. The demand for acetic acid is in excess of available supply and oxalic, tartaric and citric acids are in good request. Barium chloride is reported to be in active demand. A steady business is being done in formaldehyde and most of the wood distillates are enjoying a good inquiry. Lead oxide remains in strong request and this also applies to zinc carbonate and the copper compounds, for which there is also a good overseas inquiry. Among the soda products, the chief feature is the continued scarcity of soda ash. Chlorate and bichromate of soda are also firm and scarce. The potash products do not call for comment, with the exception of permanganate of potash, the demand in this section being greater than the supply. A persistent demand is reported from the tar products market, with an increasing export inqulry for cresylic acid and pitch. Naphthalene offers are restricted, but a fair amount of business is being done in solvent and heavy naphthas, xylols and toluols.

MANCHESTER.—A steady home and export inquiry for a wide range of heavy chemical products has been reported on the Manchester market during the past week. Textile and other industrial consumers on the domestic market have been clamouring for deliveries against orders already placed, and there is pressure from shippers also for the completion of outstanding business. The soda, potash, and ammonia compounds are all meeting with a brisk demand. The firmness of prices continues in virtually all sections, and in a number of lines a stiffening has occurred to cover higher railway charges. A steady trade has again been reported in most of the by-products.

GLASGOW.—Busy conditions have been experienced in the Scottish chemical market during the past week. There has been a heavy demand for formaldehyde, Glauber salts, trisodium phosphate and Epsom salts, but the supply position of these materials shows no sign of improvement. There was a good deal of unaccustomed activity over the whole range of chemicals in reasonable supply, as buyers were endeavouring to obtain supplies before the increased rail rates affected prices. The upward trend in prices resulting from the increased cost of bags, etc., continues. Activity by re-packers making soap substitute continues unabated resulting in heavy demand for synthetic detergents. Demand for sodium metasilicate is also heavy and the supply position is not likely to improve for some considerable time. In the export market, conditions have been a little quieter, but there is a noteworthy interest in chemicals used in the manufacture of war explosives for Greece. Some orders have again been booked.

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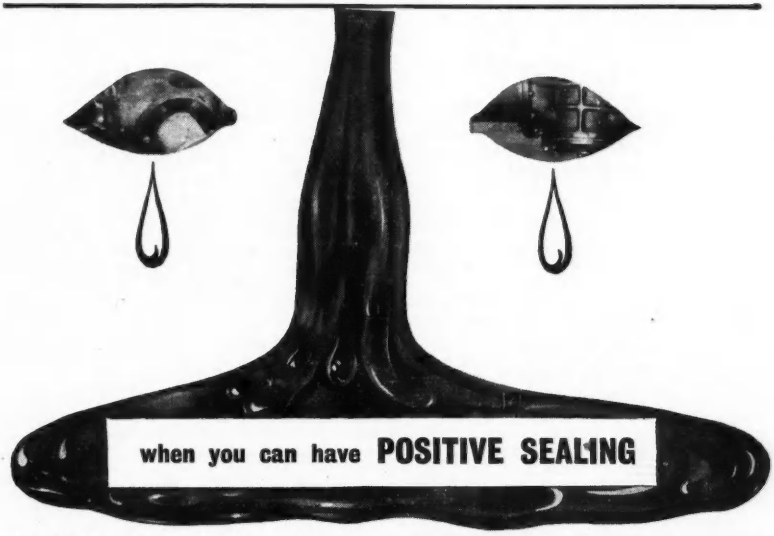

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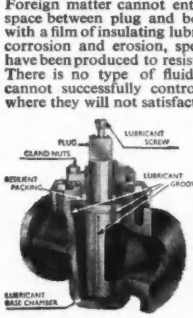

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Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Preparations containing alkali sulphides.—Ciba, Ltd. Feb. 19, 1946. (Cognate application 4661/1947.) 4660/1947.

Ferrous alloy.—Coast Metals, Inc. Feb. 9, 1945. 20836/1947.

Manufacture of varnish resin interpolymers.—Dow Chemical Co. Feb. 23, 1946. 4561/1947.

Methods of making organo siloxanes.—Dow Corning Corporation. Feb. 26, 1942. 20122/1947.

Process of preparing new antimalarial compounds and the compounds resulting therefrom. N. L. Drake, and J. O. van Hook. Feb. 19, 1946. 4726/1947.

Explosive compositions.—E.I. Du Pont de Nemours & Co. (Jan. 14, 1944.) 15308/1945.

Manufacture of a new azo pigment.—E.I. Du Pont de Nemours & Co. Feb. 19, 1946. 4696/1947.

Process for the production of nitriles.—E.I. Du Pont de Nemours & Co. Feb. 21, 1946. 5088/1947.

Production of hydrocarbon substituted silicon halides.—E.I. Du Pont de Nemours & Co. Feb. 21, 1946. 5089/1947.

Vinyl polymers.—B. F. Goodrich Co. Feb. 23, 1946. 4808/1947.

Vinyl polymers and method of producing same.—B. F. Goodrich Co. Jan. 25, 1940. 19604/1947.

Rubberlike multipolymers containing a conjugated diene hydrocarbon. B. F. Goodrich Co. March 5, 1940. 19605/1947.

Plasticised vinyl polymers and process of plasticising same.—B. F. Goodrich Co. March 1, 1941. 19606/1947.

Polymerisation of butadiene-1, 3 hydrocarbons.—B. F. Goodrich Co. April 4, 1944. 20776/1947.

Vinyl polymers and method of producing same.—B. F. Goodrich & Co. Jan. 27, 1941. 20969/1947.

Vinyl polymers and process of producing same.—B. F. Goodrich Co. Oct. 16, 1940. 20970/1947.

Preparation of ethers of cashew nut shell liquid, etc.—Harvel Corporation. August 24, 1939. 20214/1947.

Acrolein anacardic material reaction products.—Harvel Corporation. August 30, 1944. 20215/1947.

Preparation of cashew nut shell liquid.—Harvel Corporation. Sept. 17, 1945. 20216/1947.

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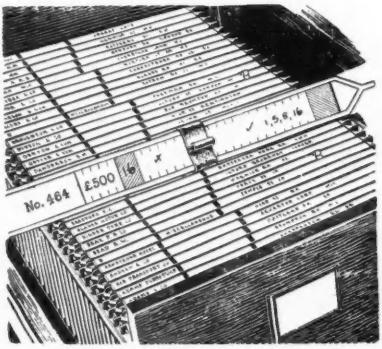

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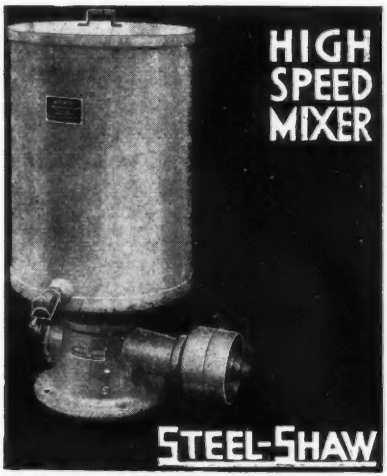

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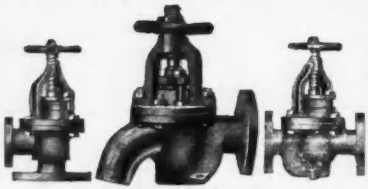
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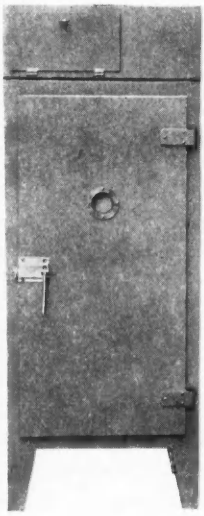

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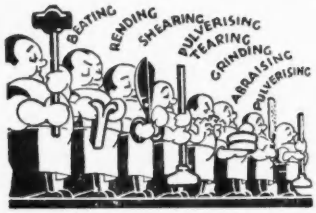

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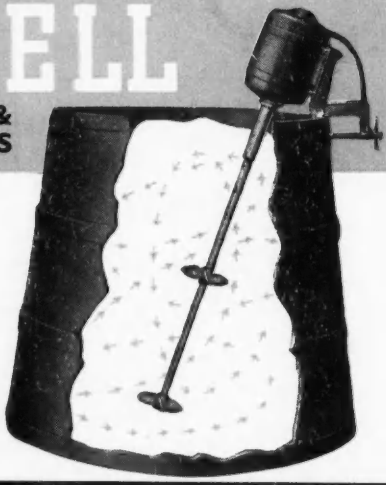

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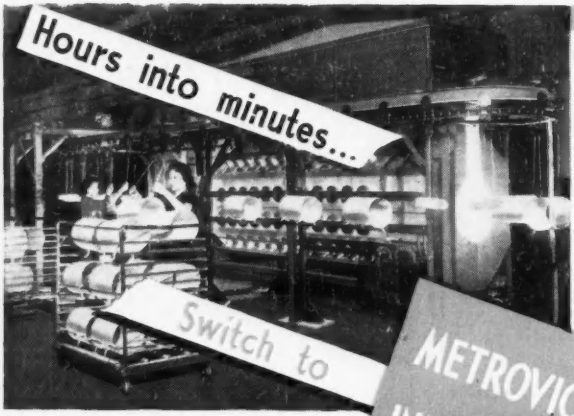

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